PROCEEDINGS

WORKSHOP ON MUNICIPAL INFRASTRUCTURE AND HOUSING

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■ CONTENTS ■

FOREWORD

DAY 1

1. ASSESSING MUNICIPAL INFRASTRUCTURE CONDITIONS

2. COST SAVINGS THROUGH ALTERNATIVE PLANNING APPROACHES

DAY 2

3. FINANCING OF MUNICIPAL INFRASTRUCTURE

4. INFORMATION DISSEMINATION

CLOSING SESSION

Appendix

FOREWORD

■ Workshop on Municipal Infrastructure and Housing ■

A workshop sponsored by Canada Mortgage and Housing Corporation on the subject of municipal infrastructure and housing was held at the Westin Hotel in Ottawa on March 22 and 23, 1995.

The main objective of the workshop was to examine economic, environmental, social, and technical issues related to the state of Canadian infrastructure, its management, condition, and financing.

The first day of the workshop focused on issues related to the measurement of the condition of infrastructure and looked at alternative community planning approaches and the relationship with municipal infrastructure.

The second day examined various public/private partnership arrangements to finance municipal infrastructure and looked at issues related to the dissemination of infrastructure-related information and ways to improve communications in this area. The workshop agenda is presented in the appendix.

Approximately 60 people attended the workshop. Participants included infrastructure experts from industry, universities, and governments of all levels. Officials from selected federal government department and agencies such as Industry Canada, Environment Canada, Public Works and Government Services Canada, the National Research Council Canada, and the Office of Infrastructure of Treasury Board also attended. A list of participants is presented in the appendix.

Papers had been commissioned to form the basis of the discussions. At the workshop, the presentation of papers was followed by panel discussions, question periods, and general discussions. The background papers, now in their final form, are the following:

- "Assessing the Condition of Municipal Infrastructure" by the National Research Council Canada
- "Public-Private Partnerships in Municipal Infrastructure" by the IBI Group
- "Changing Values, Changing Communities: Evaluating Alternative Approaches to Residential Development" by Hygeia Consulting Services
- "Infrastructure Costs Associated with Conventional and Alternative Development Patterns" by Essiambre, Phillips, Desjardins
- "An Assessment of Municipal Infrastructure Information Needs" by REIC Consulting Ltd.

Copies of these papers can be obtained from:

Canadian Housing Information Centre
Canada Mortgage and Housing Corporation
700 Montreal Road, Ottawa, ON K1A 0P7
Tel: 613-748-2367 Fax: 613-748-4069

■ Opening Remarks ■

Speaker

Douglas A. Stewart, Vice-President, Policy and Research, Canada Mortgage and Housing Corporation

CMHC is pleased to sponsor this workshop on municipal infrastructure and housing, and is most encouraged by the diversity of interests represented. In attendance over the next two days are representatives of all levels of government, universities, industries, associations, and private consulting companies. On behalf of the Corporation, I would like to thank the members of the Advisory Committee who helped CMHC to plan and organize this workshop: Guy Félio, Infrastructure Laboratory, National Research Council Canada; Paul Gravelle, Canadian Home Builders' Association; Hok-Lin Leung, School of Urban and Regional Planning, Queen's University; Hani Mokhtar, Office of Infrastructure, Treasury Board Secretariat; Serge Pourreaux, Centre d'expertise et de recherche en infrastructures urbaines; and Kathy Thompson, Federation of Canadian Municipalities.

My goal this morning is to set the stage for these two days of discussion. To accomplish this, I will first explain how this workshop came about and then describe our principal objectives as the sponsoring agency.

In 1992, in co-operation with the Canadian Home Builders' Association, CMHC hosted a workshop entitled "Housing and Infrastructure: Challenges and Opportunities." Held at the University of Western Ontario, the purpose of the workshop was to examine the social, economic, and technical issues related to the state of Canada's infrastructure.

Three years later, at this workshop, our objectives are more specific. They are: to share the results of research initiated as a result of the 1992 workshop; to examine how municipalities can assess the condition of their infrastructure; to explore new community planning and financing approaches that would reduce infrastructure costs; and to examine how best to disseminate infrastructure information.

Judging by the contents of our agenda, it is safe to say that we should prepare ourselves for two very interesting days of discussion. Each of us brings to these proceedings a unique perspective and a different set of priorities. The natural tendency will be to focus on those issues with which we are most directly concerned, and to a great extent, the success of this workshop will be determined by our effectiveness in dealing with these issues.

It is also important, however, to generate discussion on the bigger picture; to go beyond individual issues and examine the broader implications of adequate infrastructure for the economy and society as a whole. The provision of infrastructure and community services has a direct impact on every aspect of our lives, including financing, housing affordability, economic

prosperity, and the quality of the environment. The issues involve more than a simple discussion of the facilities required, how much they will cost, and who should pay for them.

We must not lose sight of the overall value of these facilities to society. For example, investment in municipal infrastructure creates jobs locally, and creates an immediate benefit — both economically and socially. It is estimated that the $6 million Infrastructure Works Program will create more than 100,000 jobs over a five-year period. But, more importantly, a sound infrastructure helps to attract future investment. The quality of our infrastructure has national and international economic implications. In today's world economy, capital and human resources are increasingly mobile. To compete internationally, business relies on quality transportation, water, sewer, and communications systems. We also need quality health care, educational, and recreational facilities to attract — and keep — a skilled and mobile workforce. In the global marketplace, good infrastructure and community service give our cities a crucial comparative advantage.

This comparative advantage is multiplied when a healthy environment is entered into the equation. In this era of environmental conscience, we are increasingly aware that infrastructure systems and technologies directly affect the health of the environment and, in turn, our own health. This is particularly true in the areas of transportation planning, energy, water supply, sewage treatment, and stormwater management. When the United Nations and other international bodies rank cities as "good places to live," a clean environment with breathable air, drinkable water, and adequate open space are always heavily weighted indicators. Ultimately, neither people nor businesses seek out polluted locations. Finally, quality infrastructure and community services, such as an efficient public transit system, accessible day care, and a responsive education system, can help to achieve a variety of social objectives by improving the mobility, employment opportunities, and overall social health of all Canadians.

While the background papers prepared for each workshop session present fairly specific objectives, the follow-up panel and general discussion will provide an opportunity for broader and more comprehensive analysis of the bigger picture. This discussion will focus on four themes: the condition of the infrastructure; planning approaches; financing infrastructure through partnerships; and information dissemination. During each session, the purpose of the discussion will be threefold: to establish what is known in each of the subject areas; to discuss how these topics relate to one another with respect to broader social, economic, and environmental issues; and to discuss what remains to be done in each of these areas.

To expand briefly on these themes, I would like to say a few words about each one.

Condition of the Infrastructure

When we talk about assessing municipal infrastructure, we need to consider not just the methods and techniques used by municipalities to measure system adequacy but also the criteria used to determine condition. The question is not simply whether our systems are coming apart at the

seams, but whether they are performing cost-effectively; whether they are protecting other valuable assets, such as our air and our water; and whether they are serving the community equitably.

Unfortunately, the ability of our systems to offer an accurate assessment of the condition of our infrastructure varies significantly among cities. Quite often, the measures we use are subjective and value-laden, and in some cases even dependent on the memory of individuals.
Generally, we need better information to better manage our infrastructure assets. Perhaps, also, we should ask ourselves whether we need a different system for assessing infrastructure condition, with new and more comprehensive performance indicators that include more than an account of leaks and breaks.

Infrastructure is more than just nuts and bolts, and the issues go far beyond dollars and cents. The benefits derived from infrastructure and community services represent a cumulative value to society and can far outweigh the capital investment in actual pipes and pavement.

In consideration of the cumulative value of infrastructure and the myriad of benefits derived, should we not be using a more comprehensive accounting system — one that goes beyond recording the number of annual complaints about watermains? Such an accounting system would give us a clear indication of the contribution made by infrastructure and services to broad social, economic, and environmental goals. It would also assist municipal decision-makers in determining where to place current and future financial resources and enable them to gain a better understanding of the necessary trade-offs. As well, such a system would provide politicians with the means to demonstrate the importance of invisible infrastructure investment to the general public, which tends to focus and favour more visual, short-term expenditures.

Planning Approaches

When a community is built from scratch, the planning and approval process provides a system for balancing the various social, economic, and environmental trade-offs associated with infrastructure. This system has its limitations, however. Historically, planning and engineering standards have favoured the "tried-and-true" and have not encouraged the adoption of innovative approaches to development. Yet, the way that communities are built greatly influences the kind of infrastructure — the actual systems and technologies — required; it also influences how much infrastructure must be built and its cost.

As many provinces and municipalities have already recognized, it is time to revisit the planning and engineering standards developed for conventional systems as well as infrastructure systems and technologies. For example, if it is possible to build a subdivision with cost-effective on-site sewage treatment, what are the implications for sanitary sewage and treatment plants at the regional level? What can we learn about new planning and engineering standards that might keep infrastructure costs down and, at the same time, make our communities more flexible and more responsive to changing housing needs?

Infrastructure Financing

Regardless of how we revisit the subject of codes and standards for building and maintaining infrastructure, the fact remains that someone must pay for it. In this context, the concept of the public/private partnership is one innovative approach that is receiving a fair bit of attention. Current fiscal reality means that all levels of government are faced with the problem of meeting public expectations regarding program delivery without having to increase either the debt load or the level of taxation. The major thrust of the recent federal budget was that all public agencies, including crown corporations such as CMHC, must redefine themselves to focus on what must be done and to work with the private sector.

In the area of infrastructure provision and maintenance, partnerships could be the key to getting the job done faster and better and to capitalizing on one another's strengths and attributes. Partnerships might also be the solution to some of the problems inherent in our current system of providing and maintaining infrastructure.

But partnerships also raise some interesting questions. For example, how should the costs and benefits associated with these facilities be distributed among partners, actual users, and indirect beneficiaries? Who should pay for what and how much? And to what extent should private partners be allowed to profit from facilities that many people regard as societal assets?

We hope that the partnership models and case studies presented tomorrow will shed some light on these questions.

Dissemination of Infrastructure Information

There is no shortage of research, conferences, workshops, and symposiums on infrastructure and other urban issues in Canada and around the world. Information abounds — some useful; some less so. The problem, however, is that available information is not always used to make more informed decisions, and that in some cases, decision-makers do not even know that information exists. In 1985, a paper entitled *Municipal Infrastructure in Canada* by the Federation of Canadian Municipalities recommended the development of better information systems, particularly for smaller municipalities. These would facilitate improved management of infrastructure systems and more effective use of funds. The recommendation for better infrastructure information-transfer was also a key outcome of the 1992 CMHC/CHBA workshop on infrastructure.

In the final session, we will be discussing how best to respond to the information needs of municipalities by addressing such questions as: What kinds of information are municipalities looking for? In what form would it be most useful? Do municipalities of different sizes have different information needs? Can municipalities pay for the information they need, and if so how much? Would an information clearinghouse on innovative infrastructure systems and their successes and failures, and the development of computer networks or data bases be useful?

As in the area of financing, perhaps the formation of public/private partnerships is part of the solution to an efficient and effective information dissemination.

In our deliberations on these four key themes over the next two days, we will be addressing many of the challenges facing Canada's infrastructure systems. Meeting these challenges will require a sustained and co-ordinated effort that involves every institution, organization, and person with a stake in an efficient and effective infrastructure.

I look forward to hearing what you have to say about municipal infrastructure in Canada, and to your conclusions and recommendations for the future.

DAY 1
Morning Session

■ Assessing Municipal Infrastructure Conditions ■

Moderator

Hani Mokhtar, Office of Infrastructure, Treasury Board of Canada

Speaker

Guy Félio, Head, Infrastructure Laboratory, National Research Council Canada
Topic: *Assessing the Condition of Municipal Infrastructure*
(Background paper: *Assessing the Condition of Municipal Infrastructure: Results from a Survey on the Measurements Used by Municipalities to Assess the Condition of Their Infrastructure*)

My presentation today is based on the results of a study conducted by the National Research Council Canada. The purpose of the study, funded jointly by CMHC and NRC, was fourfold: to look at the types of inventory and management practices Canadian municipalities were using with respect to urban infrastructure; to assess the inventory and condition of the buried infrastructure; to evaluate the adequacy of parameters used in condition assessment; and to devise a set of objective measurements to assess the condition of water distribution and sewage collection networks. The focus of the study was buried infrastructure — water and sewer — since there was neither the time nor the resources to include such visible types of urban infrastructure as sidewalks, roads, lighting systems, and recreational facilities.

Several other background studies have been conducted, including a study conducted by the Federation of Canadian Municipalities in 1985 entitled "Municipal Infrastructure in Canada: Physical Condition and Funding Adequacy." A number of key recommendations coincide with the NRC study, including the establishment of service performance standards, the reduction of bureaucratic impediments to reconstruction and maintenance, a greater emphasis on maintenance and reconstruction, and improved management systems. Another study, "Fragile Foundations: A Report on America's Public Works," which was conducted in the United States in 1988 by the National Council on Public Works Improvement, outlines similar key recommendations to the FCM study and those of other organizations.

The NRC study was designed to examine water distribution and sewage collection networks in municipalities across Canada. To date, information from 46 cities has been collected on water distribution; and information from 41 out of 49 cities has been received on storm and sanitary sewers. Four categories of municipalities were targeted: cities with more than 100,000 people (14); cities with populations between 50,000 and 100,000 (9); cities with populations between 10,000 and 50,000 (14); and cities with fewer than 50,000 people (9).

The cities received questionnaires designed to gather information on the population served, the length of the network, and pipe size, age, and material. For information on water distribution networks specifically, questions were targeted at the number of service connections and the number of pipe breaks for 1992 (1992 was chosen because information was already available).

To determine the condition of the water distribution network and to assess the level of municipal knowledge about this system, a number of questions were posed regarding maintenance, cleaning, inspection, rehabilitation, and replacement procedures; perceived technical and management needs of municipal engineers; and any comments the respondents might have.

Similar questions were asked regarding storm and sanitary sewage collection systems.

The initial mailing had a healthy response rate of 85% for both questionnaires, which was a relatively good response. Having said this, however, a number of questions went unanswered by a few cities. The reason, according to several responding engineers, was that data requested by NRC were simply not available. In some cases, the data that are available are quite specific, for example, relating to pipe materials at specific locations, but data concerning the percentage of plastic pipe in water distribution networks are unknown.

According to the NRC survey, there appears to be a great deal of difficulty in accessing information on a network-wide basis.

Some of the interesting statistics concern the age of the existing networks. Of the cities that responded, on average, about 47% of the networks are less than 30 years old; about 25% are between 30 and 50 years old; and 26% are more than 50 years old. There are extreme cases where 65% of the networks in some cities are older than 50 years: Saint John, New Brunswick; Victoria, British Columbia; Charlottetown, Prince Edward Island; and York, Ontario. In these cities two-thirds of the networks are older than 50 years. Surprisingly, some of the Canadian water distribution networks are older than the networks in France.

Metallic pipes are the predominant materials used in our water distribution networks (74%), and more than 80% of the breaks in networks occur in metallic pipes, probably because of the inherent corrosion problem. Asbestos-cement is used on average in 10% of the networks; 71% of the City of Regina's water distribution network is made of asbestos-cement. PVC has been used to a greater extent in Western Canada than in Eastern Canada as an initial material, but is the most popular replacement material.

With regard to the inspection methods used, more than one-half of the cities surveyed use the external visual method. In other words, when a break occurs, someone goes down in the trench to examine and replace the section of pipe affected. This type of "management" method hinges on the personal experience and knowledge of one, two, or three people, and many of these "experts" are rapidly nearing retirement age. Another common method also used by one-half of the cities surveyed involves the analysis of replacement sections of pipe. Other inspection methods include pressure loss and corrosion testing. Six of the cities surveyed (three of them with a population of less than 10,000 people) do not actively inspect their networks.

Of the types of measurement used to determine the condition of a water distribution network, the number of breaks per kilometre of pipe is the most popular. Roughly 23 of the cities surveyed use this method. Thirteen cities rely on the number of complaints received to gauge the condition of their networks. This highly subjective measurement is influenced considerably by the nature of the population — politically active and vocal populations are more inclined to complain. Twelve cities assess the condition of their network according to pressure and their ability to meet fire flow requirements. Personal experience — another highly subjective measurement — is used by about 25% to 30% of the cities surveyed. One-eighth of the cities surveyed use maintenance records to assess the condition of their networks.

The analysis derived from the vast majority of these measurements is extremely subjective, and among the objective measurements, pipe age is in no way reflective of condition. In the Outaouais, for example, soil conditions have made it necessary to replace some pipes after only 20 years of service. In other parts of Canada where the soils are not as aggressive, some 50-year-old networks are in perfect condition.

Another subjective parameter is the reliability of the water source. Cities are convinced that if their water is coming from a lake and the water quality is good, they have a good distribution network. There is little correlation, however, between the quality of the water that flows in the pipe and the condition of the pipe. Depending on biological treatment systems used, internal corrosion might occur, although this damage is usually minor compared to overall pipe damage.

The survey was also designed to solicit the opinion of municipal representatives regarding the condition of their water distribution network. Overall, more than 80% believe their systems to be in good or acceptable condition. Only one city reported that its network was in very poor condition. About five cities said parts of their networks are in good condition while other parts are not.

These responses indicate not only an inconsistency in the type of measurements used, but also an inadequacy. Many measurements in no way reflect the true condition of a water distribution system, yet some could be if a benchmark was set.

In terms of storm and sanitary sewage collection systems, 75% of the materials used in storm sewers are concrete; with the remaining 25% comprising steel, PVC, or vitrified clay. Vitrified clay is extremely popular in the United Kingdom because it is an "environmentally friendly" material. With respect to sanitary sewage collection systems, concrete is the most popular material (39.7%), followed by vitrified clay (31.1%). The use of PVC is more common in sanitary sewage collection systems.

Most of our stormwater/sewage collection systems are relatively young (less than 50 years into their 75- to 100-year lifespan). The separation of the two systems in the last five to 10 years has led to significant improvements and to a youthful stormwater collection system.

The sanitary sewage collection systems offer a different picture, however. There are a number of cities that have 50% of their network greater than 50 years (including Fredericton, Vancouver, and Montreal) and two (Victoria and Saint John) have a significant portion over 75 years.

The most popular inspection method for storm and sanitary sewage collection systems — used by almost all municipalities surveyed — is closed circuit television camera (CCTV) inspection, augmented by external visual inspection at the time of repair. However, the way in which CCTV is used varies greatly. While some cities use television inspection to determine the location of a blockage, others use it to rate their systems and establish priorities. Even with CCTV data, some cities do not use them in the management of their systems.

When the cities surveyed were asked to list the types of measurements used to rank their systems, all respondents cited CCTV. However, some cities do not have a rigid rating scale to rank their systems.

Personal experience is also a factor, as are the number of complaints, the age of a system (which has no bearing on the condition of a network), type of pipe material, and maintenance records (including number of backups).

Again, some of the measurements used are highly subjective. In terms of ranking the networks, however, many score in the "good" to "acceptable" range.

The question is, how valid are these subjective judgements? In the questionnaire, one city ranked the condition of its sewage system as "acceptable to good." But in a 90-minute interview, workers confessed that they had experienced so many backups and breaks in their system that they were having difficulty getting insurance.

For visible infrastructure — such as roadways — the assessment situation is different. Much more is known about these systems as compared to buried infrastructure networks simply because roads are more visible and information about their condition is more readily accessible. As well, visible infrastructure inspection tools are integrated into management systems.

One visual inspection management system is the MicroPAVER, which was developed by the Corps of Engineers in the United States and adopted by the American Public Works Association. Calgary was one of the first Canadian cities to use MicroPAVER, which is now popular in cities across the country, including Sherbrooke, Alymer, Hull, and Gatineau.

Visual inspection can be augmented with non-destructive testing, which is the case of another management tool, Pavement Management Systems, provided by a company in Cambridge, Ontario. This type of management system provides information not only on present condition but also the degradation trend; an element that cannot be gauged for buried infrastructure. Once degradation trends are available, it is possible then to look at the life-cycle of the system to predict its residual life.

All pavement systems have a minimum level of service requirement. Take a medium-grade pavement. With continuous degradation, the system will eventually reach this minimum level of serviceability. Repairs are completed and life is added to the system. The alternative is to start with a premium pavement that will give you the same life as your medium-grade plus improvements through service. Your choice is determined through a costing analysis and the technologies used.

By using improved technology at the time of initial paving or repair, one could gain one to three years of pavement life and save in the order of $300 to $400 million a year. Considering the life of the pavement — which should be in the order of 20 years — three years upfront is not a major investment.

In conclusion, the nature of buried infrastructure makes it difficult to assess. The personal experience or subjectivity of the methods used to measure or rate the condition of buried infrastructure systems is problematic. Much of the information regarding municipal infrastructure networks resides in the minds of a few key people. When these people retire or go elsewhere, that information is lost. Municipalities are forced to go back and accumulate that same data again — reinvent the wheel, so to speak — and that is a major problem. However, many cities have or are in the process of developing inventory databases to avoid this situation. As well, small municipalities have certain problems that large municipalities do not encounter. These include lack of knowledge about infrastructure systems and their impact on the community (some respondents went as far as to suggest the development of an information package that could be given to newly elected officials so they could learn about the impact of their decisions on the overall infrastructure system); and lack of standards, which leads to municipal competition on the basis of size and not long-term performance of infrastructure systems.

Crisis management systems, certainly from the buried utilities point of view, present a great problem. The need for improved systems is great. Even larger centres that have — or used to have — more resources and were able to develop better management systems are miles away from achieving the kind of comprehensive management systems for their buried, or invisible, infrastructure that they already have in place for their visible infrastructure.

Hopefully, this information has provided some context, as well as established a background for the discussions that will follow, particularly with regard to the problems facing municipalities, municipal engineers, and consultants with respect to their current methods for assessing the condition of their infrastructure.

Ottawa — March 22-23, 1995

Panelist

Serge Pourreaux, Department of Engineering, City of Montreal and Director, Centre d'expertise et de recherche en infrastructures urbaines
Topic: *The Condition of Municipal Infrastructure: A Big City Perspective*

As a topic for discussion, infrastructure has only very recently — in the last decade or so — been placed on the agendas of municipal decision-makers. For this reason, all stakeholders, including politicians and the general public, are just now becoming aware of the issues relating to infrastructure.

There are various opinions as to where responsibility for urban infrastructure resides: at the technical, managerial, or political levels.

The concerns that the City of Montreal has with regard to the rehabilitation of its own infrastructure systems are fairly typical of Canadian municipal concerns. The challenges that virtually every municipal engineering and public works department will be facing in the future are considerable: obtaining funds for the rehabilitation and maintenance of urban infrastructure (few large cities will be able to finance these projects, and taxpayers will be unable to provide the extra funds to cover the shortfall); making an attempt to communicate technical matters to the general public; and having to constantly adjust methods and practices to meet continually evolving needs yet ensure the preservation of the environment at the same time.

With regard to the rehabilitation and modernization of its own infrastructure systems, the City of Montreal began assessing ways to fund the work that needs to be done in late 1988. The fact that our infrastructure has been neglected in the past in favour of new facilities means the city is now facing a massive undertaking, technically and financially. Current indications are that rehabilitation of the city's urban infrastructure will cost between $1.3 and $1.5 billion over the next decade, but resources earmarked for the rehabilitation work total around $400 to $600 million — which means the city is facing a $900 million deficit.

The public works/engineering department is now in its sixth year of discussions with city council about how additional funding can be secured. The city has been putting together an investment plan that has attempted to take into consideration a number of concerns, including an accurate assessment of the population's service needs and anticipated trends relating to environmental protection. A number of innovative elements have been incorporated, including an increased use of diagnostic tools to improve our knowledge of the current infrastructure system.

To devise a comprehensive strategy for the rehabilitation and modernization of its infrastructure, the first challenge of the department has been to adequately determine short-, medium-, and long-term needs, particularly with regard to the invisible infrastructure. This task is virtually impossible without a clear knowledge of current deficiencies: after all, sound diagnosis produces sound remedies.

As an illustration: currently, 280 kilometres of our city's water supply conduits are more than 80 years old; by the year 2020, roughly 1,000 kilometres will fall into this category. Another 26% of the 2000-kilometre road system — including 520 kilometres of streets in the city's core area — is in poor condition.

The second challenge will be to ascertain which preventive and maintenance techniques are best for bringing the infrastructure up to acceptable standards. We can look to Europe for examples of modern maintenance and renovation techniques that have been used successfully -- and examine the possibility of their potential use in various contexts in the North American setting.

The third challenge, which will be a key prerequisite for success, is to find creative financing sources.

An approach based on life-cycle costing has its appeal. Indeed, sufficient funds could be raised to maintain or rehabilitate a particular project if monies were set aside each year and put into a special fund, starting when this project is being built. The annual allowance should represent a percentage of what it would cost to replace the infrastructure. For example, a sewage system with an estimated useful life of 100 years will require an annual allowance equal to 1% of the system's value for its eventual maintenance and reconstruction. Since infrastructure has a long life, it is preferable to go by its replacement value rather than its initial construction cost.

In conclusion, municipalities should direct their efforts to preventive and corrective measures — to maintain and rehabilitate — rather than reconstruction. In this regard, it is important to exchange knowledge and expertise, and to identify methods and techniques used elsewhere around the world that have applicability to the Canadian realm.

Municipalities must also examine different avenues for funding and increase research and development efforts.

In the latter case, one approach that can be taken to reduce a city's crippling infrastructure deficit is to employ techniques and materials used successfully elsewhere. These techniques can help to maximize our maintenance and rehabilitation efforts. In fact, current estimates suggest that the use of innovative techniques and materials to maintain and rehabilitate urban infrastructure can generate savings equal to 20% of the total cost.

It is important, however, to assess the potential of these new techniques and materials by testing their possible use through projets and experiments. This is where the Centre for Expertise and Research on Infrastructure in Urban Areas comes in. The Centre is an important mechanism of technology transfer for people working in the area of urban infrastructure.

In addition, other approaches can be adopted. For example, the City of Montreal is examining the feasibility of improving efficiency and service quality by involving the private sector more in infrastructure management and investment. As well, traditional contractual arrangements involving firms that have been hired for infrastructure work are being reviewed. There is thought being given to introducing performance specifications for pavement repairs and sewer

pipe installation. Because performance specifications are less restrictive — they are based on performance criteria rather than a strict definition of the methods and materials used in construction — they encourage contractors and consulting engineers responsible for a project to be more innovative.

Having said this, however, despite the fact that our strategy for financing Montreal's infrastructure rehabilitation centres on innovative elements rather than on a massive injection of public funds, the city will still be participating in the Canada/Quebec Infrastructure Program. Yet, the $200 million from this program will not be enough.

The continuing deterioration of our country's infrastructure will increasingly threaten the productivity and competitiveness of the economy. Every level of government — federal, provincial, and municipal — must give economic priority to the rehabilitation and renewal of our urban infrastructure. It's a small price to pay to ensure that Canada's standard of living and quality of life will continue to improve.

Panelist

Bob Funke, Town Engineer, Municipality of New Glasgow, Nova Scotia
Topic: *The Condition of Municipal Infrastructure: A Small City Perspective*

Small towns — those that serve up to 3,000 customers, or 10,000 people — have distinctly different experiences with regard to infrastructure development and maintenance than do slightly larger municipalities, which have more in common with large cities. In the recent past, small towns generally undertook infrastructure projects to cure health problems or to allow for future development. On-site sewage or septic systems — which are prone to contamination — were typical, and with the proposal of any new small housing development, industrial park, or subdivision, the developers had to lobby for a central sewage system. The developers applied political pressure and received approval for a small water and sewage system.

When the systems were in the planning stages, the municipality would receive government funding to hire a consultant. The consultant would develop the water and sewage project. However, the municipality lacked in-house expertise and was totally dependent on the consultant.

Speaking euphemistically, some of these early consultant-developed systems were quite "unique." One community of 12,000, for example, was actually five separate communities, each with its own sewage treatment plant. There were 22 sewage lift stations and various combinations of pumping systems — wetwell/drywell and submersible, to name a couple — and three "packaged" water treatment plants. People were literally travelling to Ontario, picking up a packaged water treatment plant and plunking it down in rural Nova Scotia. By and large, these early systems were maintained by a local plumber, handyman, or an individual who had worked on the project from the beginning. This person would hire a few more people as the system developed, but because everything was so new, problems occurred infrequently in the beginning. This was not so in the long run. Difficult to maintain as they aged, these systems were largely unsuccessful.

The common philosophy of the day — "if you build it, they will come" — was also misleading. The people did not come! Small towns and villages in rural Nova Scotia and throughout the rural Maritimes are not getting bigger. In fact, the current buzzword is "amalgamation." Already, super cities have cropped up in the metropolitan Halifax area and on Cape Breton Island, and amalgamations have occurred in Charlottetown and Summerside, P.E.I. The same trend is evident in New Brunswick, where seven small villages have amalgamated to form one municipality with a total population of about 4,700.

Amalgamation has a tremendous impact on infrastructure and is extremely beneficial to small towns. With a bigger or broader base, municipalities will have a pool of resident experts who will be able to provide more comprehensive maintenance on their infrastructure systems.

Decisions concerning the types of systems to be used in a small town are generally made at the council level and are often questionable. As an example, one small town decided to take advantage of the infrastructure program and elected to spend $300,000 to service 10 more people, even though their existing water treatment plant was sufficient.

Today, a tremendous amount of planning goes into new infrastructure projects. In part this is because consultants are now required to follow strict guidelines and obtain permits for the construction of water and sewer systems.

Small town officials and staff sometimes have difficulty understanding infrastructure projects -- what exactly they are and how they are to be maintained.

To effectively and efficiently maintain and operate an infrastructure system, public works officials must have a thorough understanding of what it is that they are dealing with. Professional organizations such as the American Water Works Association and the Canadian Water and Wastewater Association are important educational and training resources for local public works officials.

In today's climate of increasing government regulation, academics, provincial ministries, consultants, and utility companies are seldom given adequate notice of updates and important changes. Although updating is an essential senior government function, upfront consultation with utility stakeholders is a critical step in the process. Regulation serves an important purpose as voluntary compliance in small towns simply does not work. Local councils have other, more visible, priorities. Building a new library or a school, for example, is more publicly, and thus politically, appealing than making sure that a sewage treatment plant is working effectively.

Prioritizing according to personal desires as opposed to the greater public good is one of the negative influences of local councils — and a wrong that must be righted. To do this, councils must be made aware of the overall implications of their decisions and of the benefits of user-pay systems, full-cost pricing, full metering, and the application of sewer costs to the water rate rather than the general tax rate. Making these hidden costs visible will enable the general public to set appropriate priorities.

The creation of a National Building Code for Infrastructure and a standardized rating system would help to remove difficult "sustainable" decisions from the political agenda and would promote a more efficient and affordable infrastructure system across the country. While the initial cost of implementation would be high, standardization would allow for the effective measurement and control of municipal infrastructure. Unfortunately, these guidelines and standards might not in themselves lead to improved service delivery or extended system life, but they are a beginning.

Through the use of such mechanisms, it is possible to educate and properly train Canadians to design, build, maintain, and operate quality infrastructure without increased regulation, which should only be used as a last resort.

Panelist

Tom Field, Manager, CH2M Hill Engineering
Topic: *Infrastructure Design and Rehabilitation: A Consulting Engineer's Viewpoint*

In general, infrastructure projects — either new or rehabilitation — can be divided into two categories: "responsive" (a short-term micro approach); or "reflective" (a longer-term macro approach). It is always a sobering experience to see the impact that a major natural catatostrophe, such as a flood, has on a municipality. The financial and health implications — and the disillusionment of homeowners who once believed their infrastructure systems could withstand anything — is incredible. This disillusionment is widespread in afflicted areas. In a number of areas in Western Canada, for example, homeowners are no longer able to acquire insurance, and this is a real indication of the failure of infrastructure.

The role or contribution of the consulting engineer is the same for all municipalities, regardless of size, and to varying degrees runs the gamut from infrastructure assessment to planning to design to construction.

Unless the consulting engineer is working for a specialist firm, his or her role is quite minor in the initial assessment stage. Assessment is generally the purview of operation and maintenance staff or municipality itself. The engineer is rarely even called in.

With the assistance of municipal employees and public works or engineering departments, consultants are hired to do master planning, usually for expanding areas of a municipality. While involvement in this area is growing, consultant involvement in the area of infrastructure design — traditionally the engineer's most active role — is at a standstill. This can probably be attributed to such external industry forces as private/public partnerships and design/build.

Construction firms are primarily responsible for the construction of infrastructure. While consulting engineers have traditionally played a part in overseeing this stage, this is lessening. In fact, some municipalities are taking on that responsibility, or at least the design/build aspects of it.

Because consulting engineers are not involved in the day-to-day operation and maintenance of a system, it is difficult for them to provide solutions to immediate problems. In addition, the fact that they are also increasingly involved in competitive pricing has an effect on the type and degree of servicing available to municipalities. In some situations, up to 10 consultants have been called in to provide design services for a single project. More engineering effort is expended on the proposal stage than on the design stage. With little time left to propose and implement creative solutions, there has been a decrease in innovation, a tendency to repeat past mistakes, and an inevitable movement toward design/build.

In light of all of this, a number of issues will become increasingly important over the years, including: level of service as it relates to the performance and condition of the infrastructure; the perceptual division between "visible" (roads, recreation facilities, park facilities) and "invisible"

(water and sewage collection systems) infrastructure. Certainly, water and sewage systems are the poor cousins of the infrastructure family when it comes to the allocation of money.

There is a pressing need to assess the needs and challenges that currently confront us in the development and delivery of infrastructure. The Research Division of CMHC is already working to establish a framework for the assessment of infrastructure systems. Demand management, which has been successfully applied to the electric utility business, is one possibility. People are beginning to use the resources they have on hand to reduce demand on current systems and introduce measures to reduce future demand.

With regard to infrastructure, we must ask ourselves three basic questions:

- What is in the ground (many municipalities don't even have an inventory of their system)?
- What can the system provide: safety against a fluke storm; adequate water to meet warm summer demands?
- What is required to upgrade the system to provide the expected level of service?

In response to these questions, definite trends are emerging in the consulting industry. These include:

- the use of alternative delivery systems such as design/build (especially in municipalities that are looking at ways to expedite the development process and reduce costs) in which consultants are required to deliver a complete package that includes an engineering component;
- the contracting out of infrastructure operations (which itself will lead to innovation);
- system upgrades financed through private/public partnerships;
- the balancing of level of service with affordability; and
- the increasing influence of an informed and empowered public on the "livability" of our municipalities and communities.

Panelist

Sebastian Moffatt, Manager, Sheltair Scientific Ltd.
Topic: *Infrastructure Conditions: An Overview and Social Accounting Perspective*

Tom Field's conclusion was both a warning and a promise of hope. Today, people wishing to move to a particular area demand clean water, ample access to services, and safe buildings in which to live and work. Tomorrow, these same people might be required to ensure adequate supply of energy, clean water, and materials **before** they are permitted to become part of the community.

To begin my own presentation, I will follow up on Doug Stewart's initial comments and attempt to define better criteria for determining whether infrastructure is really serving and protecting the community; whether it is cost-effective; and whether the most accurate accounting methods are being used.

One research project in which my firm has been involved is estimating the energy and environmental impacts of a house on a life-cycle basis. Using the "Optimize" computer program, which was developed for CMHC, it is possible to look at the entire energy consumption of a house — construction, operating, and demolition (right down to the nails and shingles) — and decipher not only the total impact on the environment but also the total social environmental cost of the building design.

This type of life-cycle costing application can even be used to gauge the total environmental and financial cost of a subdivision, including municipal systems and infrastructure.

Interestingly, when the range of our study was expanded from the single-family home to include the residential area, the impact of housing on the environment and the municipal budget increases drastically once infrastructure is included.

A similar life-cycle costing approach was adopted for an integrated community energy study conducted for the City of Surrey — Canada's fastest-growing community — conducted on behalf of the British Columbia Energy Council. Using integrated resource planning processes, it was possible to study in detail the impact of two future scenarios on the city: the status quo and a completely different integrated approach designed according to the kind of opportunities and constraints facing the local area. The differences were substantial. There is simply too much variance from community to community to rely on provincial or national codes for infrastructure, energy efficiency, and water. Inevitably, efficiency will depend on the customization of codes at the local level.

In another study for CMHC, the externalities of residential development were examined and costed. In the process of using the full-cost accounting evaluative method, I developed an interesting framework or conceptual model for the discussion of real infrastructure and housing costs.

Having made this discovery, it seemed natural to ask if we need to broaden our accounting systems, and if so, how? Current accounting methods seem to be hopelessly inadequate and fail to provide an accurate picture of a typical house and its level of energy resource consumption. Despite the fact that new houses are built with sustainability in mind, for example, they are far from sustainable.

In spite of new energy-efficiency codes, better water regulations, and the installation of energy-efficient appliances, new houses in Surrey are consuming more resources than those they replaced. In the last 10 years alone, household electricity consumption in Surrey has increased by 12%.

Despite all attempts to the contrary, we are moving in the wrong direction. How is this possible? Houses are bigger. They are home to fewer people. They have more windows and more appliances, and 60-gallon jacuzzis are a common feature.

In addition to the sustainability problem, the true cost of housing and infrastructure is significantly higher than market prices could bear. Even using conservative numbers a house should cost about 50% more than it does now (more radical numbers elevate the figure to more than 150%).

This huge discrepancy distorts the picture and makes planning for housing and residential developments questionable. Policies and decisions that continue to reflect market prices ignore the true cost of items and have a significant impact on the environment. Continuing to operate in this manner will create two problems: the perpetuation of an inefficient community with too much of one type of resource and too little of another; and the inequitable distribution of costs and benefits among comunity members. It is time to acknowledge that housing and infrastructure represent at least 20% of this country's total resource flow.

If we are to move into the next century in an efficient manner, we must start pricing things according to their real cost or adopt different kinds of regulations and planning methods.

Consider this analogy: in some ways, municipal electrical utilities have been functioning successfully because they have been forced to. They use integrated resource planning, a process that involves the consideration of three key things:

- the consideration of all known resources for providing the end service (clean water for washing; waste disposal; power for lighting; and a safe, clean, comfortable living environment, for example), which includes both supply- and demand-side strategies;
- the incorporation (where possible) of all external costs and benefits (not just in dollar values but all kinds of units), including environmental impact, social equity, and economic development risk, to arrive at a full-cost accounting breakdown that specifies who is affected and how; and
- the involvement of public and other stakeholders in decisions before they are made and in ways that will offer more creative and effective resource development plans.

Involving people in infrastructure decisions is a difficult process, but it is necessary. In fact, my research on healthy communities — which coincides with the World Health Organization's new definition — indicates that the only single, reliable indicator of community "health" is the extent to which people are involved in the planning processes governing its design, development, maintenance, and operation.

Costs must be laid out so that people can understand them and can then assess which of these can or should be traded off for another to arrive at more effective scenarios. The way in which costs are expressed and presented is as important as full-cost provision, which cannot be gauged without having looked at all the options.

In our examination of Surrey, it became clear that the municipality did not consider buildings to be a part of the infrastructure. This can be likened to looking at a tree and pretending it has no roots, or vice versa. Buildings define infrastructure; the two are inseparable. When we projected the future onto the present, Surrey was not able to meet the goals outlined in its official community plan — at least in part because the city was not taking any pro-active steps to define the kind of buildings it would have for the next 75 years: buildings define infrastructure, which in turn defines resource flows. The smog level, which is already high, was going to increase. As well, Surrey would run out of electricity (thermal generating plants would be required in the "smoggy" area). Despite excellent intentions, Surrey would be far from sustainable. The reason?: the failure to establish meaningful targets for municipal planners and homeowners.

In other words, Surrey is heading in the wrong direction. Applying the integrated approach — where we had some control over building technology, transportation, and infrastructure — it was possible to turn Surrey around. The use of district heat and power plants (operational from a central switch) would allow extra electricity to be distributed to the suburbs through ground-source heat pumps on cold days when all the core buildings needed heat. The model works exceptionally well, but it will never be implemented.

There are three steps involved in full-cost accounting:

- making an inventory of resource flows required for every event (such as housing);
- identifying implications of concern for different groups (taxpayers, society, or future generations); and
- presenting the impacts in ways that make sense and can be understood.

Using this three-step process — essentially what is going on?, who gets hurt?, how is this expressed? — it is possible to set boundaries and define acceptable models for each community, each house, and each building.

What we are really talking about are the fundamentals: space, time, and matter. Looking at matter, for example, means looking at energy, land, air, water, materials, or any combination of these. Taking a step backwards, we can take a building that is using a lot of energy and ask ourselves, does energy use water and, if so, how much water? If we are looking at water, we can determine how much energy is in the water: it takes energy to make and install pipes, to build reservoirs and treatment plants, and to pump water.

Expanding or contracting the spatial scale makes a tremendous difference to implications and their associated cost. A building is not an island. It cannot be considered efficient simply because it meets R2000 standards. The entire cost of the infrastructure and energy used to situate the building and run its appliances must be considered. Failing to do so is akin to installing a flush toilet without a sanitary system. Yet, this is how we have been looking at and labelling buildings. Obviously moving from the building to the lot, to the subdivision, and to the community has radical implications for resource consumption.

The time period is another issue. Full, life-cycle costing is considerate of everything: from the extraction of materials to transportation to building fabrication and construction; and from the creation of infrastructure to its operation to its maintenance and, finally, to its demolition. Depending on the time period or scale involved, the associated costs will vary.

The result of all of this analysis is a variety of categories of impacts, and groups affected, as well as specific implications and costs, including financial, individual, and community health, physical property, the natural environment, and substainability issues. Each of these specifics will affect different groups. Financial costs or subsidies, for example, will have an impact on taxpayers. A detailed Surrey case study showed that the average single-family house is subsidized by provincial taxpayers to the tune of about $490 a year — $10,000 over the life cycle of that house! And that is just for maintaining that portion of the roads considered essential (for ambulance, fire, and work-related travel). For sewers, the subsidy is in the range of $13,000, and this just covers system upgrades that are not paid for by the homeowner.

Surrey's water systems are also being subsidized by ratepayers ($7,000 per household). The homeowner pays the $100 hook-up charge, while everybody else picks up the tab for the extra land, distribution, generating capacity, and everything else that is required in an electrically heated home.

This type of examination makes it clear that housing systems are grossly underpriced. Developers and builders will say that the market should dictate price, but this system does not work when the market is not aware of the real price tag attached to housing.

Some of the challenges that we will face in moving toward a more effective accounting system include: setting boundaries, knowing exactly what is involved with respect to infrastructure and housing, and getting a firm grip on costs. But it is difficult to document the effects of development. As an example, water runoff from the development of new lots in Surrey was affecting nursery environments and local streams, and causing an increase in fish mortality. Yet, it was impossible to obtain any information on the number of dying fish and the real environmental cost of residential development despite the general awareness that we should put more money into catchment systems, wetland management, and erosion control during construction.

Housing is an extremely complex product, which makes it difficult to determine a full cost. Just determining the life-cycle costs for infrastructure is a challenge since the exercise is dependent on continuously variable assumptions regarding how long it will last and how much repair it

will require. In addition, the absence of full-cost accounting in other sectors makes it more difficult to use the system in our sector.

One of the biggest problems associated with infrastructure is the definition of levels of access. The area of transportation is one of the few areas in which full-cost accounting has been done, and it is inextricably tied to housing services in a community. This link makes it difficult to determine what portion of the total transportation cost is attributable to the housing sector.

The incorporation of substainability and full-cost accounting is a big issue for many communities and for many people. But it comes down to optimization and trade-offs. Sustainability is an ethical obligation; a fundamental right; a constraint that must be satisfied. And it represents a pass/fail situation: either you are or you aren't. Only when we live within established targets can we optimize all other costs.

In the years to come, stable communities will be increasingly integrated, with resource cycling from one sector to another (including commercial to residential). Waste itself will be treated as a resource. Our communities will begin to emulate natural systems, building in stability and efficiency through feedback loops, resource movement, and recycling.

Ironically, the more successful we are in achieving this kind of community and infrastructure system, the more difficult it will be to model and cost our actions. Our success in one area will lead to our failure in another.

Roundtable Discussion

Joe Vincelli, from the Regional Municipality of Ottawa-Carleton, questioned speaker Guy Félio about the measurements used to assess a water distribution system, specifically why the number of watermain breaks are not considered reflective of a facility's maintenance record?

In response, Mr. Félio explained that in many cases, cities do not keep maintenance records of breaks. He did concede, however, that maintenance records are a useful tool when it comes to assessing the condition of an underground network. As for the number of breaks being reflective of a facility's maintenance record, Mr. Félio explained that this is not an all-encompassing measurement for assessing the condition of a system, but one of a number of considerations, including the number of leaks in a system. Indeed, the percentage of water lost through leakage might be a better objective measurement of the condition of a system.

Mr. Félio added that while most municipalities continue to use the number of breaks to determine when it is time to rehabilitate or replace a system, he has not found this method conclusive. In a number of cases cities have replaced several kilometres of their water distribution systems because the number of breaks has been excessive, yet there is no term for the word "excessive." Investigations revealed that only 25% of these networks needed to be replaced; the rest was in good condition.

A better way to assess the condition of a pipe is to measure home and fire flow pressures and unaccounted-for water loss. In Canada the average percentage of water lost in the system is 25%, but this figure can go as high as 40% or 50%.

While Mr. Vincelli agreed that better-defined criteria should be used, he maintained that the number of breaks is indicative of the structural integrity of a pipe. He then asked Mr. Félio to explain the kinds of items included under the category of "maintenance records" in the NRC study.

Mr. Félio's replied that there was no attempt to determine exactly what was included in the maintenance records of the municipalities participating in the study as there was too much divergence. It would be possible, however, to establish a list of objective technical items to be included in maintenance reports, then develop common criteria for determining the condition of a system.

Don Tate, from Environment Canada, told participants that he has spent considerable time collecting data on the basic economic and physical conditions of infrastructure in Canada. He expressed surprise that NRC did not look at other broader criteria in its study, including the subject of metering.

Mr. Tate attributed the difficulty municipalities have in raising sufficient funds to finance the rehabilitation or maintenance of their infrastructure to the fact that 50% of connections to municipal water infrastructure are unmetered in Canada.

Mr. Félio agreed, adding that the metering problem is most pronounced in some of the larger, older type of urban systems.

In examining the issue of municipal infrastructure from a global perspective, Roger Mareschal, a municipal councillor from Aylmer, Quebec, wondered why better measurements and assessment methods are not being used, especially since there appears to be consensus on the need for improvement.

To create a climate conducive to the implementation of better systems, said Mr. Mareschal, the municipal environment must be improved. Municipal elected officials represent a cross-section of the population. As a group they have only a general knowledge of or level of training in many areas of management, including management techniques and schedules. Although we rely on this group to make decisions for us at the local level, many municipal councils rubber-stamp proposals presented by administrators simply because they do not know any better. But are these proposals sound and do they serve the interests of the general population?

It is important, said Mr. Mareschal, that municipal administrators and staff understand the worth of what they are selling to elected officials. They must be able to show elected officials why it is necessary to have in place systems that will enhance the assessment process and allow for advance planning.

Mr. Mareschal noted that elected officials will only buy what is packaged attractively. People resist change, and unless information is saleable, it will not be purchased. Checklists are an effective way of packaging information, with indices on the usefulness and validity of each item.

Mr. Mareschal also warned against finding fault with what has already been done. Attacking the present system is not the way to sell change. It is much more effective to highlight problems and propose alternate solutions.

In response, Bob Funke commented that it is difficult to find ways to persuade elected officials to accept change because so much infrastructure is hidden. A diladipated building is obvious, but politicians and the general public are reluctant to pour money into something that is buried. Few officials get their pictures taken for commissioning a water or sewage treatment plant or replacing a waterline. Given the current economic climate, it is impossible for infrastructure to compete with the need for a new school.

One way to get around this is to remove some of the hidden costs — such as sewer maintenance — from the municipal bill and make them visible (on the water bill, for example). Metering systems is a good idea because it puts the onus on the consumer. If the consumer chooses to use more water, then it is the consumer that pays. A separate water and sewer commission would have the ability to charge for water and sewer services. At that point we can start to develop an agenda for infrastructure maintenance.

Although Mr. Mareschal agreed that we are spending a lot of money in the wrong place at the worst time, he observed that the crucial issue is not billing but dealing with inadequate infrastructure. We must be able to assess accurately the condition of our infrastructure, and then ensure that it is managed efficiently and cost-effectively. Solving this problem hinges, in part, on our ability to convince municipal elected officials that infrastructure management needs to take a new direction. The acceptance of a management system such as the MicroPAVER is based solely on its ability to save money. Even an extra $100 enables an elected official to do many things.

Mr. Félio remarked that the Paver Management System — the most highly developed infrastructure management system available — and other similar software programs will prove to be valuable decision-making management tools for buried infrastructure in the future. While it is relatively easy to measure the width of a crack in the pavement, and enter the information into a software system and then get a computer-generated assessment value, it is more difficult to assess the condition of the underground systems and understand what this represents. We can do CCTV inspections of sewers, but what effect do cracks and root penetration have on the system's service and residual life? Little has been done to address these technical issues in the past; hopefully, much more will be done in the future.

Mr. Félio also noted that the life-cycle costing concept might not be fully understood and could be resisted because it involves an investment in the future. Yet, we must make sure that whatever investments we make can be maintained at a reasonable cost over the life of the system.

Serge Pourreaux suggested that municipal engineers receive more support when defending their position with municipal councillors. He agreed with Mr. Mareschal that the real difficulty is effectively articulating or communicating the issues to the decision-makers, but noted that engineers receive much of the blame for system deficiencies when the true culprit is usually underfinancing.

Mr. Pourreaux also pointed out that while the rehabilitation planning timetable for a municipal engineer could be 15 to 20 years, the planning horizon of an elected official is only four years. In addition, it is difficult to convince citizens of the need to adopt a user-fee system for water consumption when the water system itself may be experiencing losses of between 30% and 50%.

Indeed, in a previous roundtable in which Mr. Pourreaux participated, it was concluded that it would be more beneficial for municipal engineers to appeal to the public than to elected officials.

In dealing with the public, said Mr. Pourreaux, we must speak plainly and openly, and acknowledge the difficulties faced by politicians in resource allocation. For example, in the last three decades, the infrastructure system in the Montreal region has tripled in length, which means that each citizen has 2.5 more miles of infrastructure to support with his or her municipal tax bill. At some point, the fiscal burden will be too heavy and the public will have to take an active part in financing its own infrastructure. Since urban sprawl is the consequence of a higher

level of government, people will react at the political level. As a result, the municipal politician is not the only stakeholder.

Hok-Lin Leung, from Queen's University School of Urban and Regional Planning, pointed out that setting priorities once the physical conditions of infrastructure are known is a key consideration. To do this, it is necessary to be less cynical and more rational, and to be more thoughtful and systematic in our approach. It is critical to bring together all of the interest groups: the technical staff, the engineers, the financial people, even administrative and legal groups. Politicians must also be included in the process of setting priorities and minimizing costs. Mr. Leung wondered if there were any established processes that municipalities could use to prioritize their infrastructure needs?

In response, Tom Field noted that engineers and operators have lost the ability to set priorities. Instead, they are being set at the political level. Certainly there is much more political input into the preparation of the reports for municipalities than there was 20 years ago. An engineer's report that shows there are a certain number of breaks on a length of watermain means very little to the people making the decisions. Unless politicians receive complaints from people in the affected area, they will be slow to act. For system effectiveness, however, it is crucial that the setting of priorities be brought back into the technical domain.

Although privatization is not necessarily the answer here in Canada, many U.S. jurisdictions are hiring private firms to build and operate new systems or operate existing ones. This has forced municipalities to carefully define their parameters. By applying various methods to achieve expected outcomes, private companies will meet any guidelines set for them.

While Mr. Leung agreed that technical input is critical, it is the politicians — not the technicians — who decide how funds are allocated. The earlier the two levels interface (during condition assessment is not too soon), the better.

Mr. Field added that it is impossible to deal with infrastructure deterioration on a general level. Parameters must be established at the community level.

Marni Cappe, a planner with the Regional Municipality of Ottawa-Carleton, asked Sebastian Moffatt how to put the concepts of healthy communities and sustainability — accepted in theory by planners, communities, and politicians — into practice. She expressed concern that full-cost accounting will require municipal intervention, either in the form of taxation or development charges (such as lot levies). In Ontario, said Ms. Cappe, the trend is for municipalities to lower or waive these types of charges altogether as a way of supporting the development industry. Is it possible to adopt a full-cost accounting model when it will significantly increase development costs?

In response, Sebastian Moffatt noted that there are a number of components involved in moving toward full-cost accounting. One is the setting of targets, which is an almost impossible task when a number of interest groups are involved. Nevertheless, said Moffatt, it is important to make that leap of faith, and develop targets that will set limits for each community. While

targets do exist with respect to pollution control, these have not been translated at the sectoral level to include buildings or infrastructure.

Targets are an enabling mechanism; they help people to judge their own actions and make plans within certain boundaries. With respect to infrastructure, setting initial targets or limits that will be fine-tuned later is an important first step toward securing the money required to finance the rehabilitation or reconstruction of infrastructure.

Another important contingency in adopting full-cost accounting is overcoming our resistance to change. It is essential, said Mr. Moffatt, that we do away with the traditional and arbitrary distinctions that govern our society: distinctions that make municipalities responsible for buildings, electricity, or natural gas. These types of distinctions are artificial and have no place in sustainable communities.

To switch into a true community planning mode, we must develop plans — especially in the long term — at the municipal level, not the provincial or national levels. Rather than act as the decision-making authority for communities, provincial and federal departments should support energy and resource offices at the local level and assist municipalities by disseminating skills and expertise and raising training standards of people working on the front lines. As well, they should encourage and support local champions.

Michel Gauvin, from the Intergovernmental Committee on Urban and Regional Research, asked Serge Pourreaux to explain how life-cycle costing and user fees are incorporated in Montreal's investment plan.

Life-cycle costing is used for accounting and budgeting purposes, said Mr. Pourreaux. Within the full-cost framework, a working group has been studying the use of performance specification contracts in industry, paying particular attention to European models. It is not a question of whether to use performance specification contracts but how the industry will adapt to their use. Consultant engineering firms, construction companies, and laboratories will eventually form development consortiums, which will have a profound impact on the nature of contractual relationships between businesses. Discussions are currently under way between developers and insurance companies, to discuss contractual guarantees of five, 10, or 15 years and to determine the liability of engineering firms, construction contractors, and those enterprises responsible for site control and monitoring. The concept of performance specifications is useful, but the market is not yet ready to accept this kind of change.

As far as user fees are concerned, said Mr. Pourreaux, the concept is already entrenched in large cities like Montreal and will be used increasingly elsewhere. The "centre of responsibility" will have to be defined for budgeting and independent investment purposes. Any discussion of priorities must place emphasis on the provision of infrastructure requirements in the municipal budget and offer a management component dedicated to deal with it.

Ernest Clarke, from the Nova Scotia Department of Housing and Consumer Affairs, asked Sebastian Moffatt if it wasn't unrealistic to expect the house — or even the community — to be

a self-sustaining system? He also questioned whether a per house street subsidy paid by the province would reflect a larger system of sustainability at the regional, provincial, and even federal level?

Sebastian Moffatt replied that sometimes transfers, subsidies, and hidden costs are used to share wealth between different groups within a society. It might be unreasonable to expect homebuyers to pay the full cost of a transportation system that is only in existence or required because the location of their homes makes it a necessity. These types of costs are hangovers from a time when we needed a lot of development, fast.

We should rely on the marketplace to guide public action, said Mr. Moffatt. The alternative is to become lost in a network of complicated and ineffective taxation schemes; struggling to achieve the same level of efficiency as quickly and effectively as the market. Market reform is the way to go. As well, the province might want to pay for some residential roads. Everyone is a householder, but some houses are built at a much higher cost than others. Burying these costs in taxation schemes means that the person who lives in a mixed-used, high-density, neo-traditional, ecologically sensitive urban community pays the same amount of road tax as the person who enjoys a much less sustainable lifestyle.

Real wealth is declining worldwide and will continue to do so. In such situations, we must be careful to reward the person who is doing the right thing and not the one who is doing the wrong thing. In municipalities where water is not metered, the person with the cheapest water will use the most water. The more direct the feedback, the more efficient we will become. As a sidenote, Mr. Moffatt commented that putting a boundary around sustainability is an arbitrary exercise. A house, a community, even a region or province can be considered a sustainable system and the question of scale will vary from issue to issue.

Mr. Moffatt added that it is unrealistic to expect a house to pay its full way; its portion of the sewage treatment plant, reservoir, electrical generating plant, or road network. If that were the expectation, no one could afford to buy a new house. People must be assisted in their attainment of housing.

Ken MacLeod, from the British Columbia Ministry of Municipal Affairs, asked Mr. Moffatt what techniques he used to produce real changes in behaviour. With respect to the gross discrepancy between market prices and those driven by a full-cost accounting system, for example, who set the prices and according to what criteria?

In response to this question, Mr. Moffatt noted the need for innovative market reform. Resource use is grossly inefficient. The market is artificial, and reform is critical where resources are becoming scarce. Pricing for energy is an excellent example of vigorous reform. The move from a declining rate structure to an inclining rate structure — where your electricity triples if you consume more than your lifeline rate — will get the attention of the most nonchalant consumer. They will be first in line to retrofit their appliances or their house to get back down to a reasonable level of resource consumption and into the "cheap" rate. By playing with property taxes and resources rates, it is possible to make people adopt a sustainable lifestyle — one that

will keep community consumption rates within reasonable targets and protect surrounding ecosystems.

This has already occurred with respect to the use of electricity in some municipalities. In California, said Mr. Moffatt, the health costs associated with automobile use were documented and an analysis made of what would justify low- and zero-emission vehicles. A full-costing exercise led to the development of less polluting technology. Costing exercises can be used to justify reform, and the private sector can be encouraged to develop and initiate new quota-based technology.

Joe Vincelli, from the Regional Municipality of Ottawa-Carleton, asked Guy Félio to comment on the next step and wondered whether this would involve the establishment of guidelines, standards, or targets for the municipal engineer.

Mr. Félio explained that the National Research Council is currently developing cost-effective, practical, diagnostic tools that will allow engineers to use the data generated to predict residual life and develop cost-effective rehabilitation and renewal methods in consideration of social and environmental cost, risk, and safety. To date, however, there is no developed technology that can be used to proceed to the next step.

With regard to financing the next stage, Serge Pourreaux proposed that the answer lies in the global productivity of the system. With higher quality inspections, he predicted that overall costs could be reduced by 10% to 20%. With new rehabilitation technologies, a further 10% to 20% reduction should be possible. The introduction of performance specifications represents an additional saving of 10% to 20%. With increased efficiency and the leeway that exists within the system, it is possible to save 30% to 40%, which would allow us to fix many of the problems we currently face. Municipal engineers can then use these successes — cost savings and performance quality — to convince politicians to make an additional effort.

Municipal competition adds further complexity to the issue of gaining political support for the creation or rehabilitation of infrastructure. Because of the importance of the fiscal base, Canadian municipalities fight to increase their population. Homeowners often gravitate toward those municipalities that do not require infrastructure retrofitting or rehabilitation since the catching-up game inevitably has an impact on the tax bill or property values.

Therefore, there is a concern that management solutions that lead to increased system productivity originate from within the municipal administration rather than outside of it. The answer is not a political one. Politicians must be made aware of new inspection technologies. They must be encouraged to maintain current engineering budgets and to give engineers some latitude in the allocation of these funds. It is not a question of how much there is to spend, but how to spend it; how to improve the performance quality of the engineer's work.

In conclusion, Mr. Félio left the audience with this food for thought: if we were in a position to take advantage of the best available technologies in the world, Canada would save more than $1 billion a year on its infrastructure expenditures.

DAY 1
Afternoon Session

■ Cost Savings Through Alternative Planning Approaches ■

Moderator

Hok-Lin Leung, School of Urban and Regional Planning, Queen's University

Speaker

Ken Ferguson, Hygeia Consulting Services

Topic: *Changing Values, Changing Communities, and Evaluating Alternative Approaches to Residential Development*

(Background paper: *Changing Values, Changing Communities: Evaluating Alternative Approaches to Residential Development*)

One simple fact we must never forget is that the market drives everything. Everyone involved in the housing industry — the builder, the developer, the municipality — has a customer. We do not put infrastructure in the ground to give people work; we do it as a response to a need — and that need is driven by the market. But because no one knows exactly where the market is going, it is difficult and frustrating to steer it and give it direction.

Regarding market evolution, the suburb was born after the Second World War, in a time of great prosperity. The desire to own a large, open space was a dream often driven by television. There was a lot of dependence on the automobile — not just one per household, but two! This meant that houses could be increasingly further away from the urban centre. This outward move was supported by relatively low land prices. A companion evolution occurred in municipal standards. Suddenly roadside ditches were no longer good enough; and there had to be sidewalks on both sides of the road for greater safety. Consumer expectation drove municipalities to introduce "gold-plated" services, although local government was enthusiastic about the prospect of greater security and less maintenance.

But today, we are reaching a point where something has to give. We cannot afford to go on as we have done for the last 50 years. Things are starting to break down. Lower-density developments outside the urban core cannot support public transit. Highways are becoming increasingly congested. Urban sprawl, and the intrinsic need to link one low-density community to the next to stretch service provision, has increased the cost of major infrastructure. Suburbia is crying out for more schools and social infrastructure, and there is greater development pressure on agricultural and environmentally sensitive lands. All of this is creating a burden that is no longer affordable.

Given this situation, it is not surprising that many professional planners and others in the development industry have started to pursue alternative planning approaches. Over the past year, Hygeia Consulting and REIC Limited have been evaluating a number of these, including neo-traditional planning, transit-oriented development, environmentally sustainable communities (eco villages), and co-housing, which is not so much a development type as a subset of planning.

In determining the effects of these different models on planning issues and infrastructure, we developed "an evaluative framework" — essentially a guideline or checklist — to ensure that each and every social, environmental, and economic factor is considered in the planning of a new community. Our premise was that sensible and successful development or regeneration is not simply the imposition of a plan or model on a piece of land. It involves the careful consideration and incorporation of a myriad of elements and issues. Our evaluative framework provides a prioritizing process that, when followed properly, yields a better understanding of what a proposed community should look like.

We tested this framework by applying it to a number of communities that were in the planning stages or the early stages of development. These included Bamberton in British Columbia, McKenzie Towne in Calgary, the Cornell community in Markham (northeast of Toronto), Montgomery Village in Orangeville (north of Toronto), and "Heart of Springdale" in Brampton, Ontario, which ultimately failed to proceed.

Each of these plans offered significant improvement over more conventional designs, but each fell short in a number of areas in which they might have gone further. We concluded, however, that no development plan should be based on a preconceived model, since the actual model is only one factor in the achievement of a healthy and sustainable community.

Given our current situation, then, why are there not more built examples of alternative planning approaches, and why haven't even modest improvements been adopted in existing communities?

To answer this, I would like to refer to a study undertaken by John Bousfield Associates, as well as look at a number of specific projects. The study shows a theoretical development next to a fairly conventional plan in the Metropolitan Toronto area. The community, which was redesigned to bring down the cost of infrastructure and housing, was neither neo-traditional nor eco-village, but a combination and refinement of the two. The redevelopment plan proposed a fairly intense style of development, including 12-metre (40-foot) right-of-ways. All the requisite services were provided within this narrower road width, which made the goal of producing more affordable housing achievable. This study was completed in 1976. I have been carrying it around with me for almost 20 years.

How far have we really come in 20 years? We are not yet building on 12-metre (40-foot) road allowances, and a lot of other things proposed in the Bousfield study have not come to pass. What all of this demonstrates is that while we have been talking about new development styles for a long time, little has changed. The handful of innovative builders and professionals who have fought against conventional standards to introduce change are the exception to the rule.

I am currently involved with a number of interesting projects, the pitfalls of which I would like to discuss today. One of these is a waterfront community in the Greater Toronto area. The second is a project that involves the revitalization of a waterfront community in an industrial town a little farther north of Toronto. The third is a planned community called Seaton, which many of you from Ontario will recognize.

The first is the Lyndshores Community, a waterfront community in the Town of Whitby in the Greater Toronto Area. Lyndshores, which will eventually house about 6,700 people, is right on Lake Ontario, making the environment a significant issue. While the lakeshores have lost most of their wetlands to development, Lynd Creek, near the site, is one of the few remaining Great Lakes wetlands and is classified as a Class I wetland. The concept plan was very carefully thought out, and a great deal of forward thinking went into the issue of environmental protection. An environmental management plan was developed for the community well in advance of the wetlands policy introduced in 1992, and the types of initiatives that have been implemented to preserve the wetlands exceed even those outlined in the wetlands policy. The plan was endorsed by the local conservation authority and the Ministry of Natural Resources.

The town, the region, and even the Crombie Commission had input into the overall community plan and endorsed it as an excellent example of the way in which development can be accommodated adjacent to an environmentally sensitive area. The open space master plan, which followed the environmental management plan, detailed the kinds of planting, buffers, and walkways that would be incorporated in the open space next to the marsh.

Until the environmental studies had been completed, the town had not given any thought to a subdivision. Eventually, however, a plan for a subdivison was submitted. The plan was quite conventional — and quite disappointing given the environmental initiatives already proposed and the opportunity to take those initiatives further in terms of housing type, infrastructure, and layout. The roads have wide, sweeping radii and wide streets. The ring road that runs next to the marsh is a 26-metre right-of-way — all other right-of-ways are no less than 20 metres wide. One milestone for the town is the incorporation of third pipe systems in some of the stormwater sewers — a direct result of concern regarding sewer depth in relation to lake level and the threat of surcharging. However, even stormwater management ponds were a bone of contention. Although the town recognized the overriding need for detention ponds and their inherent benefits, it did not want them and was extremely reluctant to grant their approval (even with a 90-year warranty!).

The Ontario Realty Corporation, an arm of the Ontario government, is developing the surplus lands next to the Whitby Hospital. Incorporating some neo-traditional elements in its proposal, the developer included five- and six-storey buildings with small courtyards, laneways and some fairly leading edge medium-density housing. None of the developer's innovative suggestions survived the approval process. What was approved was a conventional apartment block and townhouse subdivision.

What is happening in Whitby is happening in most municipalities across Canada. The prevailing attitude is, "Why should we embrace change when the tried-and-true is working so well. We are the ones who are going to have to look after it for the next 100 years." It is hard to fault this kind of thinking, but it makes change very difficult.

The second example I would like to present is Port McNichol. This former rail town, flanked by Georgian Bay and Wasaga Beach, Midland and Penetangue, and Severn Sound, is a community in which innovation might meet with more success. As the major port for grain coming from western Canada, Port McNichol enjoyed a strong economy for a long time. Eventually, however, progress — particularly railways and the Great Lakes Seaway — made the town redundant. Today, Port McNichol comprises about 990 hectares (400 acres) of Canadian Pacific land and very little employment. Together with CP and another partner, Hygeia has entered into a joint venture to redevelop the area as a waterfront community. The potential is virtually unlimited. We have a village that has been in a time warp since 1940 and a community that has the initiative and the motivation to change. Many issues must be considered, socially (due to high levels of unemployment), fiscally (as a result of economic stagnation), and environmentally (due to the need to protect a considerable amount of Class II and III Great Lakes wetlands).

Although Hygeia had little involvement in the Port McNichol development/revitalization project at the outset, our planning principles were applied (this was prior to the development of our evaluative framework). Priority was given to the protection and promotion of the character of the existing village. Of particular importance was the preservation of Port McNichol's historical and cultural background, enhancement of its natural features, protection of its waterfront, and improved public access to the waterfront. The idea was not to make a "gated" community in which the new would be separated from the old, but a blended one. A mix of land uses was proposed, as well as a diversity of housing types and plans for staged development.

Inspired by developments in other areas, a number of different schemes have been developed to date, and we are very optimistic about our chances for approval of a very innovative development plan. What is the difference between Port McNichol and Lyndshores? The fact is Port McNichol needs this project. It is a municipality where nothing else is happening. We are its future, so it is prepared to do things the way we believe they need to be done — and our vision includes such innovative elements as narrower road allowances and roadside ditches.

One drawback is that the sewage treatment plant, which is currently operating at capacity, must be expanded to accommodate new growth. This is an enormous undertaking that involves environmental assessment and a lot of public meetings. And there is nothing mechanically innovative being considered for sewage treatment, despite the fact that the community sits on a Great Lakes wetland.

Hygeia has also been involved in the Seaton project, which involves a fairly large piece of land owned by the Ontario government. In partnership with another firm, Hygeia was shortlisted to provide a design for this development. Our design, perhaps one of the most sustainable ever presented, was clearly left-wing, and its level of innovation was almost certainly the reason we

were not chosen as the winner. Our scheme was environmentally sound, incorporating John Todd's living machine for sewage treatment. In the name of true sustainability, we were going to collect our own water — from streams, underground wells, and stormwater — and would not be connected to any external water source. The size of the development would be determined by the carrying capacity of the community — a water-based decision.

Although we did not label our scheme "neo-traditional," it did incorporate a number of these elements. But it was a case of form suiting function: it was the best way to achieve the densities, rear lanes, and green spaces that we wanted. The result was a lot of ecological preservation and a small number of villages. The total population accommodated was 50,000; the province was looking for 90,000. We were asked to reconsider this in the second stage, but could not due to carrying capacity and marketing — we could not sustain the density required to house 90,000 people and still make the development marketable.

Clearly, the time for change is upon us. Environmental and social concerns are on everybody's mind. Change will come, but it will not come in big lumps like Seaton or Bamberton: they are too hard for people to swallow. Rather, it will come in bits and pieces; the odd person breaks new ground and gets noticed. And change will not come in the form of one particular, preconceived planning model. Each new and innovative plan will be unique, carefully crafted in consideration of the regional and local context and the various social, economic, and environmental factors at work.

Speaker

Ray Essiambre, President, Essiambre, Phillips, Desjardins Associates Ltd.
Topic: *Infrastructure Costs Associated with Conventional and Alternative Development Patterns*
(Background paper: *Infrastructure Costs Associated with Conventional and Alternative Development Patterns*)

The study was undertaken by our firm in partnership with J.L. Richards & Associates Limited, C.N. Watson Associates Limited, and A. Nelessen Associates Incorporated. The process was a challenging one, but extremely worthwhile, allowing us to assess and compare the cost-effectiveness of a conventional suburban development and an alternative development, planned according to the principle of new urbanism. We analyzed the long-term life-cycle costs of 15 service components, and differentiate between the public- and private-sector costs in both plans.

There were a number of components to our study methodology:

- selecting a 150- to 500-hectare site for comparison purposes;
- comparing development statistics of the two plans in terms of dwelling units, land use, population, density, road dimensions, schools, and infrastructure;
- developing a methodology and financial model to assess the private and public life-cycle infrastructure costs, including emplacement, replacement, operating, and maintenance costs;
- determining the costs for the two concepts (in 1994 dollars);
- comparing and assessing these costs and identifying the reasons for any differences; and
- discussing the implications of the findings from a community planning perspective.

The test site we selected is located in Barrhaven, an existing community just south of Ottawa. Separated from other developed areas, it represents the statistical average of a suburban subdivision in Ottawa-Carleton and is typical of conventional subdivisions found across the country. Barrhaven is approximately 20 years old, and has taken some time to build out. It is one large, low-density community, with a poorly-defined neighbourhood structure. Commercial uses are confined to the perimeter of the site along arterial road frontages. The commercial component is very low, only about 6% of the total land area. The street pattern is curvelinear, and houses are predominantly single-family, with some townhouse development and very few apartments. If features a less compact form, conventional right-of-way road widths, car and bus orientation, no laneways, and sidewalks on only some collector roads. There is one multi-purpose recreation centre and four schools. The linkages in the park system are not well-defined.

The alternative plan (overlaid onto the same geographic area) is based on the principles of new urbanism, modified to suit the site. It includes five distinct neighbourhoods and a commercial core that starts at the east end of the site and moves into the centre of the community along a main street. Additional commercial development is accommodated along an arterial road and stops at the future site of a transit or light-rail station. The modified grid street pattern is well-defined, with a major collector road serving as the local transit loop. The four schools in this development are grouped, two placed at either side of the multi-purpose recreation centre and two more at the opposite end of the development. The park system is linked, with green areas

extending beyond and between the neighbourhoods to create a common identity. There are four commercial areas or neighbourhood centres. They feature a small park, a small retail centre, and one apartment block. Houses that front onto the arterial road are served by a 10-metre wide, one-way laneway, rather than a full street. To make this compressed development form as efficient as possible, every possible innovative technique was incorporated.

In comparing the two plans, we found that the amount of residential development differed significantly. The alternative plan uses less residential land (-20 hectares) but accommodates more residential units (+2,800). This means an increase in population of almost 8,000. The increase in density in the alternative plan is 21 units per hectare. Thus, with the alternative plan the number of residential units increases despite a decrease in land consumption, an increase in commercial development and recreation space (+ six hectares) and the provision of an equal number of schools. The amount of transportation-related land consumption, however, iincreased by about 10 hectares as a result of road rights-of-way and 13 extra kilometres of roads and laneways.

Once the concepts were developed, we measured and compared the capital, operating and maintenance costs of 15 service components. The costing methodology was based on a detailed costing of the existing infrastructure inventory as if it were being built in 1994. Some services — the multi-use recreation centre as well as fire and police service, for example — were apportioned to the community according to their relative use. To determine capital cost, the public and private contributions for initial emplacement and replacement were determined. Operating and maintenance costs, derived from the 1994 operating budgets of the various agencies, were apportioned to the site. An internal apportionment reflected commercial and residential allocations. Dividing the present value calculation by the number of units within the project and the population yielded per unit and per capita costs.

The total life-cycle cost for the conventional development was $500 million. The life-cycle cost for the alternative development model was $794 million, a cost difference of about $300 million. Total first-time public and private emplacement costs were $48 million and $16 million more, respectively, in the alternative plan. Replacement cost was $12 million more in the alternative plan.

These gross numbers were then broken down into per unit and per capita costs to the public. In total per unit cost, there is a cost savings of $9,372 per unit with the alternative plan. These savings are only possible when the higher densities proposed in this model are achieved.

Because the most expensive component of life-cycle costing is long-term operating and maintenance (with schools and school transportation ranking as the most expensive items), design strategies that reduce operating and maintenance costs should be community planning objectives. Life-cycle costs that are related to such linear services as roads and pipe services are less per unit in the alternative plan because of higher densities and an increased apportionment of cost to non-residential uses. New urbanism is not a viable option where densities are low and parkland per thousand population is high. In terms of percentages, the parkland component in

the second plan — without contravening municipal or provincial Planning Act requirements — was approximately the same as in the first, yet the population has increased significantly. This is because parkland in the conventional plan was over-supplied. The alternative plan allocated the "extra" land to the residential component to achieve increased density.

The replacement cost of infrastructure is not a significant life-cycle cost component. In fact, it represents a smaller amount than any of the emplacement, replacement, operating, and maintenance costs.

In terms of housing affordability, if the cost savings realized in the alternative plan were distributed throughout the system and somehow passed on to the purchaser, it would be possible to create more affordable housing.

Finally, an increase in the level of service provided through the creation of additional sidewalks, greater separation of cars and pedestrians, and the addition of rear lanes might improve the liveability of a community. If the lifestyle and liveability/cost tradeoff is considered important, then the alternative plan offers a definite advantage.

Inherent in this study are a number of limitations: the lack of comparable work, the regional specificity of cost figures and standards and levels of service, the influence of residential densities and non-residential uses, and the inability to consider wide price fluctuations in life-cycle costing analyses. As a result, further research into the life-cycle costs of alternative patterns of community development would be useful. Examples of future research opportunities include:

- repeating the exercise in various communities with a range of residential densities and land use mixes, in communities with differing geography, and while changing certain key variables;
- examining potential cost savings through alternative designs of schools to be combined with parks and other schools;
- studying the market potential of the alternative plan versus the conventional plan;
- augmenting the scope of analysis to include land costs;
- including the revenue side of the equation in the financial analysis;
- carrying out the analysis over the macro or regional level as opposed to the community level;
- examining impact on modal splits and the effect on transportation infrastructure requirements and their costs; and
- devising a model to estimate the social and environmental costs of one pattern of development.

Panelist

Owen Tobert, Manager of Urban Development, City of Calgary
Topic: *The Municipal Perspective*

Through the development of McKenzie Towne, the City of Calgary has had some experience with alternative forms of development and can envision, to some extent, the future development of suburban areas in our city as they relate to the principles of new urbanism.

The new urbanism planning aspects of McKenzie Towne were initiated and pursued by the largest residential developer in Calgary. By offering Calgarians a new housing option, the developer — who, at 5,000 lots per year, had already captured 25% of the total market — felt it would be possible to increase its share of a fairly conventional housing market.

The planning aspects of new urbanism — higher residential densities, mixed land use, pedestrian orientation — were all quickly embraced by municipal planning officials. Relevant approvals were granted within six months of application, with the result that the project is now under development and marketing is slated to begin in the next few months. Municipal engineering officials, however, were not so enthusiastic. They were concerned that the principles of new urbanism would translate into more roads, more intersections, more right-of-ways. My own research indicates that right-of-ways in neo-traditional plans typically consume at least 30% of the developable plan area. With a typical curvelinear plan in Calgary, road rights-of-way account for only 20% to 25% of the development area. From a yield standpoint alone, therefore, curvelinear design is more efficient.

But most of the engineering resistance was not related to yield efficiency or maintenance obligations, but rather the concern that certain of these design principles fell substantially below existing standards. Much time and attention were devoted to the discussion of very specific design details, such as the radii of curb cuts. Municipal engineers were afraid that in promoting pedestrian accessibility, the new plan compromised vehicular safety.

As well, some of the planning aspects of new urbanism seemed to be introduced at the expense of engineering standards. For instance, the installation of shallow utilities under the sidewalks in all of the residential right-of-ways would make subsequent maintenance very difficult.

In the end, however, McKenzie Towne was approved. The city is using the development as an experiment or working model; further application of this type of planning will be restricted until this first development is up and running. From a marketing perspective, a number of other Calgary developers — those who are not put off by the yield issue — are anxious to experiment with the principles of new urbanism, since the public appears intrigued by the concept.

The degree of public interest is interesting, given that certain of the aspects of new urbanism were violently opposed by some existing residential communities and elected local officials. Their opposition stemmed from the issue of Calgary's "environmental road guidelines," or

allowable vehicle trips per day per road. Inherent in the grid system design is an increase in the number of allowable vehicle trips per day on some roads, many of which would run close to existing communities. The fear was that if higher maximums were applied to new communities, this would spill over into all communities in time.

Although new urbanism in Calgary was initiated by a developer, the city is pursuing the adoption of a number of these principles on a city-wide basis through the "Sustainable Suburbs" project. The city is currently growing at a rate of 10,000 to 12,000 persons per year, and this, combined with an internal redistribution of residential density, is causing rapid growth in Calgary's suburbs. Suburban expansion, in the form of conventional curvelinear design, has resulted in mile after mile of homogeneous single-family homes — and the servicing of this kind of development is costly, especially with regard to utilities and transportation systems. It is hoped that the implementation of suburban development guidelines based on the principles of new urbanism — higher densities, mixed housing types, and land uses — will mitigate the impact of suburban growth on the city's operating budget.

There are two primary drivers behind the push for new urbanism in Calgary's suburbs: to provide a more attractive living environment, and to encourage the decentralization of employment and changes in suburban travel patterns. Typically, Calgary features mile after mile of wide roads flanked by two-car garages. By incorporating such new urbanism design features as treed boulevards in new suburban communities, Calgary's planning department is hoping to provide pedestrians and cyclists with more attractive environments.

The second driver, and the one that has municipal engineers excited, is the ability to mix land uses in new communities. This would allow for employment opportunities outside of the downtown core and the opportunity to make profound changes to the existing travel patterns of suburban residents. It is hoped that, with time, the incorporation of new urbanism principles will result in a decrease in the amount of infrastructure investment required for such transportation systems as arterial roads and grade-separated interchanges and an increase in bus and light-rail transit use.

The City of Calgary has already accepted new urbanism as a positive model for the future. The real challenge will be to gain support for alternative forms of development not only from elected officials and existing communities, but also — and perhaps more importantly — from the developers who are anxiously monitoring the success of McKenzie Towne.

Panelist

Art Mellish, President, Consor Developers Inc.
Topic: *The Homebuilder's Perspective*

Many of the costs that builders pass on to the ultimate homebuyer are generated by the developer. It is the developer who establishes the pattern of development and the cost for land.

In looking at and attempting to introduce alternative forms of development, the housing and development industry is responding to market demand; addressing the fact that consumers are looking for more than what is offered by conventional planning models. But competing forces are at work in determining what form our new communities will or will not, should or should not, take.

There are the existing adjacent homeowners with their "NIMBY" (not in my backyard) attitudes and concerns. There are the prospective new homebuyers with exactly the same attitudes regarding single-family homes, multi-family development, and commercial development within their neighbourhood. There are municipal councils with their very real concerns about the tax base, future post-developer/homebuilder municipal costs, and protection of taxpayer interests where competing land uses are concerned. There are the municipal employees with their responsibility for setting planning and engineering standards, approving designs, and maintaining the new infrastructure. And there are the private developers with their interest in making a profit from their investment.

What are we doing? We are developing and selling reasonably-sized housing on smaller single-family lots at affordable prices. We are integrating multi-family land uses and single-family components. We are developing commercial centres within our communities (although we need more compatible employment centres beyond the commercial core). And we are producing housing designs that are sensitive to the increasing demand for home-based businesses and employment.

We can, however, achieve much higher densities than what we are achieving today. Although municipalities are not likely to relax zoning restrictions to accommodate such alternative design elements as laneways, major walkway systems, smaller local parks, and decreased sideyard separations, cost savings can be achieved through the implementation of minor planning changes. We can develop smaller, local, housing-oriented parkettes instead of major parks surrounded by roadways and underground servicing systems for housing only on one side of the street. We can eliminate the need for transit on minor, collector, and local streets by redesigning the circulation system. We can decrease right-of-way requirements for all the roadways and other servicing systems.

We can revisit infrastructure engineering standards from two perspectives: the initial capital cost of installation, and on-going operating and maintenance costs. We can reduce carriageway widths on our roadways. (At present our local streets allow for parking on both sides with enough room down the middle for two cars to pass, while adjacent multi-family projects feature on-site parking to accommodate at least one-and-a-half vehicles per residential unit. Cars are parked on the street — not in the parking lot — because we have made it convenient to do so.) Already, we have replaced concrete and clay tiles in most sanitary sewer lines with plastic pipe and watertight joints; installed sump pumps to keep ground water from entering the sanitary sewer system; and outfitted most new homes with such water-conserving devices as low-flow toilets and showers. But we are still using the same roughness co-efficients, infiltration allowances, and per capita discharge rates as we did 30 or 40 years ago. We are building larger and deeper sanitary sewer trunks that will take 25 to 30 years to complete, without making any allowance for technological advancement. These contradictions are clearly unacceptable.

What we *call* the planning form really does not matter. We are already incorporating and embracing at least some of the alternative principles of environmental sustainability in our attempts to limit environmental impacts and reduce resource demands. And we are moving toward the increased densities and land use mixes supported by new urbanism — albeit more slowly.

One very real concern, and this applies equally to both conventional and alternative forms of development, is the full-cost accounting of infrastructure. When this is incorporated as part of the total cost of housing, each residential unit prices out at between $250,000 to $350,000 — before we lay hammer to nail! Homebuyers must know the truth about the real cost of their housing. Then, perhaps, alternative forms of development might not only seem more palatable but more necessary.

Panelist

Ron Desjardins, Brethour Research Associates
Topic: *The Consumer's Perspective*

From the market perspective, or the consumer's point of view, there is a clear and definite potential for new forms of land development and housing in Canada. As decision-makers and housing providers, however, we have not been approaching the matter in the right way. Far too often, new concepts are promoted at the expense of the old, despite the fact that, historically, we have done an excellent job in providing Canadians with housing. In terms of achieving progressive development, there is nothing to be gained by telling municipal bureaucrats and politicians, developers and builders that everything they have done over the years is wrong.

The concepts of and potentials inherent in new urbanism and other forms of new development and housing alternatives are valid, and should be promoted that way. Why? Because the industry is changing. We are producing higher densities and more mixed-unit developments. We are building on smaller lots. We are developing better stormwater management systems. We are producing more energy- and resource-efficient housing. We are effecting change, and we must be extremely careful about how we market and promote new forms of land development and housing.

Outside the small circle of those committed to change, there are three groups of people — or client groups — that have yet to be brought onside: municipal and regional government authorities, developer/builders, and, most importantly, homebuyers.

Experience tells us that the opportunity for change exists. Studies clearly show that people are looking for something new. Where new housing and development types have been embraced in the United States, there is a great deal of homeowner satisfaction. People like their new communities and, by example, this creates an opportunity for new forms of development in Canada.

As well, our population is aging, and this creates a new demand for housing types. The traditional family structure no longer exists in most of our communities, and we have to think of ways to accommodate new family types. Economic conditions have created the need for more affordable housing. People are making a clear choice about the kind of housing they are willing to purchase. Many are down-buying. People who can afford a $200,000 single-family home on a 15-metre (50-foot) lot are purchasing 150 m^2 (1600 ft^2) townhouses on 6-metre (20-foot) lots. They are making a lifestyle choice about their housing type and how it relates to other aspects of their lives.

The emergence and growing popularity of home-based businesses will have a profound impact on future housing requirements. In the United States, the number of people currently involved in home-based businesses is equivalent to the combined populations of Texas, Florida, and Georgia — and this number is increasing rapidly. In the high-tech City of Kanata, near Ottawa,

home-based businesses are growing at an alarming — and very positive — rate.

These are the trends that will have an impact on future housing requirements in this country. People are looking for, and need, alternatives, and we have a golden opportunity to provide them.

Municipal governments, too, are in desperate need of new, sustainable, and appealing development types. Canadian municipalities are facing some very real problems, and the development industry tends not to attempt to address them. Where new urbanism projects are presented, they do not offer any real solutions to pressing municipal problems. What will be the effect on snow storage and property taxes? Who will be responsible for the lane in the backyard? Where are the kids going to play baseball and soccer? Because the concept plans presented provide for very small parkettes and linear open spaces, there are no places for soccer pitches.

These concerns are very real and must be addressed, yet there is no honest, fundamental approach to do so. One solution is to think about the end-user, the homebuyer. It is my understanding that the new urbanism and neo-traditional projects that have been undertaken have not made use of consumer-oriented market research. Yet, an understanding of what consumers want — and are prepared to buy — and how exactly we can provide it for them is critical to the success of these developments.

Our cohorts in the United States devote much more time and effort to understanding consumer wants and needs at the outset of the development process. If Canadian builders and developers altered their procedures slightly to get the consumers — the people with a real stake in the delivery of the finished project — onside first before approaching municipal and regional governments, we would be more successful in selling our new options and ideas.

In the example of Barrhaven, the cost of new, higher-density development forms was significantly higher in total but slightly lower on a per unit basis. The problem that must be addressed is that consumers will be reluctant to accept the significantly increased densities in larger projects required to cover higher development costs. To gain pubic acceptance and even enthusiasm, it might be more reasonable to introduce new development types through smaller projects of 10, 20, or 30 hectares. This approach has proven successful in the United States. These smaller, pilot projects are used as a springboard to larger developments. They serve to introduce the concept to the public and to provide builders/developers with an opportunity to learn from their success and failures before tackling a major development. Rather than gaining public support and getting the consumer onboard, massive and radically different projects like Seaton frighten people away.

The most critical factor in implementing market change is selling the process, or getting the stakeholders to "buy in." This exercise has three key steps: talking and, more importantly, listening to homebuyers; presenting municipalities with realistic solutions to their problems; and undertaking manageable projects, projects that are small enough in size and scale that everyone can understand and relate to them.

Roundtable Discussion

Roger Mareschal of Aylmer, Québec, pointed out that — according to figures provided in the background paper and amortized over 75 years — the additional expense associated with alternative forms of development over conventional development types is only $7 per year. Thus, public resistance does not arise over additional costs, but fear that the fundamental characteristics of traditional development will be sacrificed in alternative models.

With all the recent talk about increased public transportation, non-dependence on the automobile and densification, people are wondering exactly how administrators and politicians define quality of life and what gives them the right to define it for anyone else? For many consumers, quality of life does not mean cramming a lot more people into a smaller space, with less breathing room and no place for their children to play. Mr. Mareschal suggested that the first step should be to define "quality of life." If decision-makers could agree on a definition and then poll consumers to see how many agree with it, they would then have a rough idea of the size of the market for alternative kinds of development.

According to Mr. Mareschal, spending billions of dollars on systems that many people seem to resent is not a very sympathetic or caring approach. Since elected officials are supposed to represent the electorate by caring for its needs, then it is the responsibility of elected officials to show the electorate how alternative approaches to development will benefit this and future generations. The public should be shown how it can modify the way it uses the environment and gently directed in a more responsible direction. Elected officials must sell the public on change.

Mr. Mareschal stated that it is wrong for one group of people to decide how another group of people should live and cautioned those in attendance against "playing amateur sociologist." He suggested that the public should be spoken to in a language it understands. If it does not have the information required to understand what is being said, then it should be trained, educated, and sensitized. Then, once the public decides that what is being sold is worth buying, it will.

In response, Ken Ferguson pointed to the importance of doing up-front market research — of asking people what it is they want — and the difficulty in doing just that. With our current system of development approval, the ultimate buyer has the least amount of representation. Public planning meetings involve the *existing* public, not the people who will eventually inhabit new communities. Thus, the only way to actually determine what people want is to build a number of alternative communities, see how they are received, and proceed accordingly.

Ray Essiambre noted that the point of his company's study was not to tell people to live a certain way, but to provide some previously unavailable information on the life-cycle cost of housing to municipalities. The message to municipalities was that, because increased density is key to the concept of alternative development, where proposed densities cannot be achieved the operating costs of such developments can be very high. Whether or not people buy the concept

or how it should be marketed, said Mr. Essiambre, is the basis for another study.

It is the risk factor that Mr. Essiambre's study intended to bring home. Municipalities are cautioned to beware of buying into a process simply because it is popular, and must always be conscious of the fact that they — not the developers — are responsible for maintaining infrastructure over the long term. Since infrastructure is the biggest cost associated with alternative forms of development, where proposed densities (which are 60% higher than the norm) are not achieved, these costs can be significantly higher.

Mr. Desjardins shared with the audience the results of two substantial market research studies undertaken in the United States: one that involves people who have bought into and are living in new urbanism or neo-traditional communities, and another that involves people who have simply visited such communities. Both groups express a definite preference for the product in general — the concept, the pattern of development pattern, indeed all of the principles of new urbanism they have experienced. The response rate for both of these surveys was in excess of 50%, a phenomenal return for a mail-out questionnaire. "Satisfactory" ratings were in the 70% to 85% range.

A Canadian alternative development standards study, commissioned by the Regional Municipality of Ottawa-Carleton, solicited the response of the public to a number of the principles of new urbanism. The response was very positive, especially with regard to narrower streets, smaller lots, linear parks, and walk-to commercial areas.

With regard to the market research that has been done, said Mr. Desjardins, there is a clear desire among the "buying" public for something other than what is currently available. And, in the United States at least, there is a corresponding willingness to pay for it. The people surveyed were prepared to pay between $3 and $5 per square foot more for a home in an alternative community. Ottawa-Carleton respondents, however, were looking for a good deal. They were prepared to buy in, but expected to pay less than the market rate for a comparable house in a conventional subdivision. While the expectations are mixed, the desire for something different is undeniable.

Looking at two less-than-successful alternative Ottawa developments — Lebreton Flats and the Rideau Street Transit Mall — Elliot Rodger, from Public Works and Government Services Canada, asked those present if any retrospective evaluation had been done on finished projects that incorporate alternative solutions.

In response, moderator Hok-Lin Leung of Queen's University commented on a study (*Residential Density and Quality of Life*) he recently undertook on behalf of CMHC. The study, which examined quality of life and residential density in existing developments, focused on resident satisfaction. Among low-, medium-, and high-density dwelling types, medium-density dwelling units — rowhouses, garden apartments, and so on — were the least satisfactory. Although this was not the anticipated result, it might be explained in terms of ambiguous resident expectations. People know what to expect from a single-family home or a high-rise apartment

building — and they either get what they want, or they don't. But the same kind of certainty does not exist with medium-density dwellings. One thing the study clearly indicated is that, while planners believe ground-level entry to be of paramount importance to the consumer, consumers are more concerned with other things — room size, street security, and so forth.

Mr. Essiambre suggested that the safest strategy is to test ideas and "look before you leap." The Rideau Street Transit Mall, now being dismantled, was the product of a popular theme. The amount of market research that went into it and other closed-street malls of the same era is questionable. With regard to Lebreton Flats, said Mr. Essiambre, there has been considerable controversy as to what should be done with this parkland, from stadium construction to residential development, but certainly location and market demand are very real considerations.

As project manager, Mr. Essiambre felt more qualified to comment on the development of the CMHC national office lands. When the site was first considered in 1987, one of the suggestions was to adopt a neo-traditional design. A key factor in the decision not to attempt an alternative development was marketability: would there be enough buyers? The concept was popular in Florida and housing demand in Ottawa was strong, but a market study recommended a conventional model.

The project is now 50% complete. CHMC installed the infrastructure and sold lots to builders. Mr. Essiambre was doubtful that a neo-traditional approach would have been successful. His advise to the audience was to "keep your feet on the ground, test the market, and if it doesn't make sense don't do it." He agreed with Ron Desjardins that if change is to come at all, it will come slowly, in small blocks, and that the concept of alternative development will evolve over time. Before investing public dollars, decision-makers must be sure that the concept will sell.

Steven Bright, of the Canadian Real Estate Association, was curious about the effect that the aging population will have on housing, both existing stock and new development. If one in three Canadians is retired by the year 2030, as studies suggest, what will happen to the stock of large, old homes? Will they be divided into multi-family units, or will they be bulldozed?

In an attempt to shed some light on this situation, Ron Desjardins confirmed that there would indeed be a significant impact on housing. Much of the housing stock generated in the last half-century will not meet the needs of an aging population and the impacts of this are already being felt. Niche markets are developing in most communities, and the demand for relatively small, two-bedroom/two-bathroom bungalows with loft options and maintenance-free exteriors is expected to increase. If, indeed, one in three Canadians is financially able to retire by the year 2030, it will still be necessary to offer this population three or four new housing styles. This will require the consideration of a number of design, location, and infrastructure issues that are not visible in the suburbs of today.

In terms of the future of the existing stock, there is some concern that there will be a significant drop in value of this stock over time, but Mr. Desjardins predicted an immigration-driven future market for today's housing. For Canada to survive and grow in the world economy, however,

immigration will have to increase to offset the impact of aging on our population.

The question of simple ownership as a factor of quality of life and consumer preference — of special concern to Maritimers — was raised by Ernest Clarke of the Nova Scotia Department of Housing and Consumer Affairs. In answer, Mr. Essiambre stated that there was no change in the simple ownership ratio when comparing conventional and alternative forms of development. The study assumed that the two plans would contain roughly the same percentage of single-family housing and apartment units with their relative tenure types, but would increase density in the townhouse category. The only other real change was the addition of office and apartment space over ground-floor Main Street retail in the alternative plan.

Hani Mokhtar, of the Office of Infrastructure — Treasury Board of Canada, asked whether the increased density in the alternative plan for Barrhaven was achieved through smaller housing units, smaller lots, or both. The answer was smaller lots.

Contrastingly, Ted Bryk, of the Canadian Home Builders' Association, told the audience that the greatest resistance to alternative approaches and the application of new technologies comes from within the public works sector. Frustrated and without the financial resources or the patience to push for innovation, developers eventually opt for the conventional way of doing things because it represents the path of least resistance. Talking about alternative methods of development is not enough. Change will never occur unless municipalities (and in some cases, provinces) agree to modify some of their ingrained rules and regulations.

Ken Ferguson agreed. In his experience with the Whitby project, apparently simple improvements — the introduction of 8-metre (25-foot) wide semi-detached lots, for example — presented major obstacles (despite the fact that Whitby already permitted single-family homes, attached below grade, on 9-metre (30-foot) lots). Although the land owner was supportive — assuming there was no extra cost either in terms of time or money — the proposal almost caused the loss of certain concessions in the negotiation process. In the end, it was neither worth the fight nor the risk of slipping backwards. Until the "silent purchaser" becomes involved, literally bangs on the mayor's door with requests for alternative products, the prospect of change is slim. The only people currently in the picture are the existing residents, and what they are designing is not what other people want but what they will allow.

Owen Tobert was also in agreement and discussed his intimate acquaintance with municipal inertia and inflexibility. McKenzie Towne's developer spent more than a year — and a great deal of money — wooing municipal officials and local politicians before submitting its application. Tobert called these the "pioneering costs" of innovation. The "trailblazer" in the Calgary case was a very large developer, who was motivated to stay the course (which included almost $1 million in planning fees prior to approval) by the potential of a very lucrative development. The city was concerned that relaxing standards would be expensive in the long run, and before approval was granted the developer had to prove that this would not be the case. Only a very large developer could have afforded the level of steadfastedness, or stubbornness, required to see this particular process through; smaller developers would have to use smaller projects to experiment with

innovation. Mr. Tobert predicted, however, that over time — and if pioneering results prove attractive and successful — administrators will become familiar with alternative types of planning and receiving approval will not be as challenging.

Mr. Essiambre noted that the Regional Municipality of Ottawa-Carleton has commissioned a study to look at alternative capacities for sanitary and storm and water sewers. Innovation is occurring in small pockets across Canada — at least 15 regions have made significant design standard changes — but most municipalities have little access to information from across the country. The development of an information clearinghouse would make it easier to achieve innovation, eliminating the need to continuously reinvent the wheel.

Representing the Canadian Institute of Planners, Doug Kalcsics of the City of Winnipeg raised the question of relative assessment and revenue. While the average annual property tax bill in existing Winnipeg neighbourhoods is roughly $850, new homes are taxed at a much higher rate; approximately $2,800 per year. As a result, the city is keen on new development because of the revenue it generates.

It was noted by one of the panelists that market studies on five American projects indicate that, per square foot, initial purchase prices were higher in alternative developments than in conventional subdivisions and that asset appreciation in the alternative models was also greater. Thus, where tax assessment is based on market value, alternative developments generate more revenue than their traditional counterparts. Cynthia Clarke, who worked on the comparison with Mr. Essiambre, admitted that this very significant component was not within the scope of their conventional versus alternative site development analysis. However, since alternative developments generate a much higher non-residential component — and commercial properties are generally taxed at a much higher rate — the municipality would derive more revenue from alternative developments.

Ken Ferguson disagreed, pointing out that this is only true in isolation. In reality, a community can only support a certain amount of retail development. The rest will go elsewhere and drive up revenue there. He added that the cost/revenue equation is highly dependent on the regional context and that every conventional, low-density residential subdivision cannot be turned into a high-density alternative development. The Barrhaven example would not work in Winnipeg. And it probably wouldn't work in Calgary. The McKenzie Towne project did not have significantly higher densities, which destroys the alternative development economic assumptions. The real issue is density, and the way in which higher densities are achieved in Winnipeg will be different from how they are achieved in Toronto or Vancouver or Halifax or anywhere else. It is not a simple issue.

One of the panelists referred to a study conducted by a national firm of chartered accountants on behalf of the City of Winnipeg. That particular analysis used data and criteria similar to that considered in the Barrhaven study, but examined a conventionally planned subdivision with regular densities. Even when life-cycle development costs (not only for the infrastructure itself but for running city hall over the next 75 years) were factored into the equation, the net tax base

for the community resulted in a net revenue of $8 million a year. The panelist cautioned that before municipalities adopt new urbanism and higher densities, they should be sure that the revenue generated will be significantly greater than $8 million a year. He reminded the audience that homeowners — not roadways and parkways — pay taxes.

Mr. Desjardins suggested two ways in which the alternative development movement could be "popularized." The first is based on workplace adjustment and the home-based business phenomenon. Approximately 80,000 people in the Ottawa area — employers and employees — work at a home-based business, many of which are located in a conventional suburban house. This is creating a need for retrofitted housing and the creation of different housing styles. It is a niche that is still not well understood, but the building industry might be able to meet the needs of this population through the creation of alternative developments in outlying suburban areas. The second is based on decentralized, community-based health care. Rather than have people travel great distances to receive treatment in one large, central hospital, there is a major movement afoot to pull the components of the hospital apart and provide less expensive, more efficient service in the communities where it is needed. Much of the employment space presented in the Barrhaven model could be occupied by community health care workers.

Anne Beaumont, with the Ontario Ministry of Housing, expressed concern regarding the prevailing notion that neo-urbanism exists in a pure form. She observed that it is impossible to recreate Alexandria in Washington or the Beaches in Toronto on another city fringe somewhere. As well, critical analysis in support of neo-urbanism compares it to the suburb as it was built 20 years ago (Don Mills, usually, but Barrhaven is one of them). However, "conventional" suburban development is not the same today as it was two decades ago. It is a changing form, one that has adapted to the marketplace and to new development pressures. Ms. Beaumont suggested that if certain features within the neo-urban form promote improved liveability (and these should be identified), then perhaps that should be the objective of alternative forms of development, not affordability.

In response, Mr. Essiambre remarked that the definition of "liveability" is a very subjective one and rests with the individual. The Glebe in Ottawa is a functioning example of an alternative development; on the outskirts of town is Kanata, a new "conventional" development. Glebe residents love the Glebe; but Kanata residents love the suburbs. Because what suits one person will not necessarily suit another, liveability is neither quantifiable nor portable.

Ken Ferguson also agreed with Ms. Beaumont and referenced a CHMC study called *Changing Values, Changing Communities*. That study looked at a number of different development forms and emphasized the fact that neo-traditionalism or new urbanism does not exist in a pure form. Planners and professionals were encouraged to look beyond the attributes of a particular model and to consider a myriad of community and regional issues. The study proposed seven factors that comprise a healthy, sustainable community: resource conservation (including land, materials, water, and energy); environmental impact (on such things as greenhouse gases, ozone impact, air, water, and soil quality); economic viability (considering infrastructure, marketability, and community stability); equity (access to services and amenities and the basic needs of food,

shelter, and clothing); liveability (considering services and facilities, public/private open spaces, convenience of movement, climate, and light); community inclusiveness (opportunity for participation, heritage, identity, and social gathering); health and safety (in terms of health protection, promotion, care, and safety). Evaluated, weighed, and prioritized, these factors will determine how a community is designed. Mr. Ferguson referred to new urbanism as "the flavour of the month": it was new and different, and everybody seemed to like it. It became the panacea of planning; as if the implementation of "new urbanism" — whatever it was — would solve all the issues confronting a municipality. But Mr. Ferguson cautioned against starting with a road pattern and then imposing it onto the natural features of the land — it won't always fit. The Seaton plan was not a "new urbanism" development, but the evolution of a number of ideas.

Mr. Tobert referred to a City of Calgary study called *Sustainable Suburbs*, in which liveability — or really dissatisfaction with the existing housing product — was one of the primary drivers. As a municipal official, Mr. Tobert saw his role as one of facilitator. His job was to step back and observe the result of developer experimentation. If improved liveability (or any other benefit that does not carry a price tag) was a by-product of alternative development, then perhaps any concessions or relaxations could be applied to other proposals.

Moderator Hok-Lin Leung added that there is a vast literature on the parameters of liveability, from shelter to neighbourhood quality to access and availability of services and facilities, and emphasized that liveability should be a consideration in any debate over development form.

Joe Vincelli, from the Regional Municipality of Ottawa-Carleton, noted that another key player that is resistive to change — and one that has not yet been considered in the discussion — is the private utilities. He agreed with the need to modify current standards to accommodate innovation, but said that municipal engineers would require time to determine what changes would be beneficial. Mr. Vincelli questioned the benefit of laneways. If standard road widths are reduced from 20 to 15 metres, and then a six-metre laneway is added, what is the advantage?

In response, Mr. Essiambre commented that the laneway issue was debated extensively in the expanded study. Should laneways be included in the development plan? If so, who should maintain them? Really, it is a question of aesthetics; a quality issue that will be determined by the municipality.

Mr. Vincelli questioned the aesthetic value of a laneway that serves as little more than a garbage collection point, but Mr. Tobert told the audience that laneways are an extremely important marketing feature in Calgary subdivisions. Since 1905, laneways have been used extensively in the city, with virtually every subdivision ever approved offering some sort of laneway component. For a variety of reasons (storing a recreational vehicle, for example), a certain segment of the market wants access to the rear of their lots. Laneways are more than just a point for garbage collection, especially where lot widths are narrow. In McKenzie Towne, front-drive garages were prohibited; residents have to park their vehicles at the back of their houses. Without front-facing driveways, additional parking spaces are accommodated on the street, a critical political consideration in a narrow-lot subdivision. With regard to maintenance, the city

is responsible for grading on an annual basis, but not for ploughing, since the laneways are not paved.

Cynthia Clarke added that certain municipalities, including the City of Mississauga, have been dealing with the issue of laneways from an engineering standards standpoint and in consideration of our aging population. In particular, the issues of improved emergency and security service access, as well as garbage collection, are key points for discussion.

Although he was originally sceptical about their usefulness, Mr. Ferguson told the audience that he believes there is a role for laneways in some residential developments. It is not necessary, however, to throw away a century of conventional development design — front-facing garages, for example — just because something new (or new again — laneways have been used for years in Toronto!) has come along. Depending on the context, one or the other might be more appropriate.

A companion issue to this one, said Mr. Ferguson, is the exponential growth in public expectation. Fortunately, economic reality has forced us to stop and examine where exactly we are going, and acknowledge the fact that we cannot maintain or augment our level of service. Pubic-sector layoffs, reduced garbage collection, and homeowner meter-reading are just some examples of the implications of this realization. This, predicted Mr. Ferguson, is the direction of the future: we cannot keep adding to the burden because no one can afford to pay the freight. This kind of thinking spills over into such areas as the laneway issue. Where laneways are incorporated in a design, the important consideration is function. Look at the ways in which laneways have been used in the past — today, in areas like Calgary, they are neither paved or ploughed — and emulate that. When laneways were introduced in Markham and Cornell, they were wide, paved, curbed, and guttered with underlying storm sewers and overhead lighting. They are not laneways, they are small streets. The economy has been lost.

Picking up on Mr. Ferguson's point, Doug Kalcsics was curious as to why the laneway, which has been in existence for many years, is considered a new or neo-traditional concept and asked the larger question — is anything new?

Serge Pourreaux raised the issue of using urban infrastructure planning to curb urban sprawl. Because current methods of infrastructure rehabilitation are extremely costly, Mr. Pourreaux suggested that growth planning should focus on developing new concepts for revitalizing older neighbourhoods. Existing infrastructure must be maintained regardless of whether or not it is used to capacity; and the potential cost savings from avoided new construction are significant. Safety is another consideration. Reintegration and neighbourhood safety programs — required when populations exit to the fringes, leaving behind poorly maintained neighbourhoods with pockets of excessive crime — are expensive to operate. Repopulating neighbourhoods and rehabilitating infrastructure increase community safety and affordability. While the development of some new neighbourhoods is necessary, Mr. Pourreaux suggested that at least half of current and future housing demand could be accommodated within existing urban boundaries and serviced areas.

Mr. Tobert reported that the City of Calgary is experiencing a similar "hollowing out," not because of its size but because of its age. Inner-city areas are losing density to the extremities. The new inner-city communities comprise primarily single occupants, usually an empty-nest widow or widower. Mr. Tobert believes that administrators have little influence over the repopulation of these areas and that by increasing development charges at the extremities developers might eventually be forced back into the inner city for reasons of cost efficiency.

Mr. Ferguson, on the other hand, expressed a great deal of interest in inner-city revitalization as the way of the future. He agreed with Mr. Pourreaux that 50% of new growth could be accommodated within the existing built-up area. Mr. Ferguson referenced several projects — Port McNichol, a revitalized industrial area, now residential, within the urban core; a redevelopment project in North York that will substantially increase the previously low density of a 40-year-old townhouse community — as examples of this opportunity. He cautioned, however, that environmental issues such as soil contamination and the associated clean-up costs — which was the death knell to the Ataratiri railway lands revitalization project in Toronto — can hamper or even squash such projects. He suggested that a little perspective would go a long way toward an acceptable compromise: people are going to live on the land, not eat it.

Recognizing the amount of under-utilized land in our cities, Mr. Essiambre spoke in support of intensification. He accredited the historical vibrancy of Canadian cities to the level of support given to inner-city neighbourhoods and core areas. As recently as the 1970s, neighbourhood improvement was a federal initiative. Despite this, however, many large parcels of inner-city land remain vacant, partly due to the amount of infrastructure investment required to develop them. Future development is not always a consideration in initial planning documents: sewers are not over-sized to accommodate adjacent growth, for example. In Ontario, the new provincial *Planning Act* will address some of these issues through promotion of intensification and discouragement of housing outside of established settlement areas.

Roger Mareschal spoke in favour of densification, but expressed concern about its promotion. Quebec passed similar legislation in support of intensification, but is thwarted in its intention by the rules governing who can intervene in a planning process, and under what conditions. That province is divided into zones, and if a piece of property in the middle of one zone is targeted for development, people in a neighbouring zone — no matter how many miles away from the proposed development — can "interfere." As long as processes are in place to prevent the ultimate purchasers from offering their input, intensification will be difficult. It is not enough to implement policies that encourage densification. Policies must also create the kind of conditions that are conducive to progressive development, conditions that respect democracy while accommodating change.

Mr. Mareschal suggested condominium development as a possible solution. Higher densities can be achieved without public cost. Such developments are more expensive, but the extra cost is a private, not a community, expense born by the people who choose to live in the development.

Mr. Mareschal also pointed out that official documents, such as those produced by CMHC, lend a great deal of credibility to new ideas and go a long way in gaining the support of municipal authorities. Federal letterhead, he said, carries much more weight than the words of any visiting development expert.

Cynthia Clarke added that one way to promote intensification is to make municipalities aware that when their population base migrates out of the core and into the outer reaches, inner-city infrastructure must still be maintained, operated, and eventually replaced. If the inner-city population cannot support the cost of its infrastructure, the extra burden will fall to the people moving into developments on the outskirts of the municipality.

Ken Ferguson was in complete agreement with Mr. Mareschal. There is no easy solution to the problem of promoting intensification; certainly municipalities are not swayed by consultants or developers who claim to have done their research and have identified a group of people that want to buy a particular kind of house. They have too much to lose and too little to gain; they simply cannot afford to make a mistake. Mr. Ferguson also shared his belief that money changes everything, and when economics are such that compact housing is the only affordable option for a vast number of people, demand will drive the market in the direction of intensification.

Moderator Hok-Lin Leung observed that while the suburban single-family home has been the icon of the "good life" for a lot of people for a long time, other good-life icons are beginning to emerge. As to which will catch on — large lot exurbia, gentrified city living, designer-suburbs — it is impossible to predict, but it bears remembering that the single-family suburban house was for the elite only less than 50 years ago.

Robert Cumming of the River Oaks Group — developer of two so-called new urbanism communities in Ontario — told the audience that the group's approvals were hard fought but won on the basis of merit. The tools used to create the new urbanism fabric are the same ones used to create Don Mills in the 1960s and rear laneways in Toronto and Calgary and other municipalities across the country in the 1920s. The differences lie in a slightly altered infrastructure delivery system and the inconveniencing of some coveted perspectives. The group's detailed economic studies showed that there was very little difference in economic impact; it was simply a new marketing tool, a way to satisfy the appetite of a group of people who wanted something different. Rather than challenge the precepts that municipal engineers have held dear for so long, these new developments are simply putting the same components in a different package.

The River Oaks Group incorporated publicly-owned rear laneways in their developments to achieve increased densities, which would in turn pay for the other benefits provided within the community. By reducing the number of cars parked on the street, rear laneways lead to a more attractive front streetscape and narrower lots. Although this has been provided for years in condominium developments, the River Oaks Group wanted to provide its purchasers with the same benefits and freehold tenure. Had the group opted for condominium tenure, the approval process would have been shortened by a year. In the end, the municipalities involved were

persuaded to give the group the benefit of the doubt and the go-ahead.

Picking up on Ken Ferguson's point about environmental considerations in redevelopment, Ted Bryk (CHBA) told the audience that, in his experience, the biggest stumbling block to intensification is soil contamination. Until realistic contamination criteria are established, said Mr. Bryk, Canadian downtowns will remain barren.

In support of Mr. Bryk, Ken Ferguson referred to the Port McNichol railway redevelopment project. On a clean-up scale of one to 10, Port McNichol rated a one-and-a-half — not a serious problem. But where will the developer put 110,000 cubic metres of contaminated material? Some windows of opportunity are now opening up: some of the material can be placed under certain areas (the standards are less stringent for commercial and industrial uses); some can be placed under the pavement; some can be used for berming in certain areas. Using a combination of these options, the developer will still be left with 15,000 cubic metres of contaminated landfill material, and in Toronto it is hard enough to find landfill sites for garbage, let alone dirt. Mr. Ferguson agreed that the soil contamination issue will continue to confound and discourage developers. The problem is so profound in the United States that banks are very careful about what properties they foreclose on. In many cases it is better for the bank to refuse to take up ownership in mortgage default situations because the land clean-up liability carries a higher price tag than the land itself.

One of the participants noted that nobody wants contaminated sites, yet somebody is always stuck with them (often the municipality), and there is always an associated cost. Another person added that the contamination issue is an example of history that should not be repeated. Future generations always pay the price for earlier actions, and in our case we are suffering the consequences of a generation that did not look at life-cycle costs or think sustainably.

Hani Mokhtar commented that the situation facing the development industry and the implementation of alternative development strategies is analogous to the situation facing the automobile industry in the mid-1970s. When the car industry was told to reduce the size of the cars it was manufacturing, the debate was much the same: just as people today are wary of alternative methods of development, people 20 years ago wanted nothing to do with the little Japanese boxes that suddenly appeared on the market. After much focus group testing, however, the car industry found that people were willing to buy a small car as long as it was fully loaded, had a lot of guts, and could produce more horsepower per cc. Today, people have developed a fondness for an automobile that they were unwilling to touch two decades ago. This gradual conversion was made possible by extensive market research. The industry found out, for example, that women were reluctant to enter a showroom or a service bay because they were offended by the attitude of car salesmen and mechanics — and it changed these things.

Mr. Mokhtar expressed scepticism regarding the widespread use of focus group testing and its credibility. He wondered how often developers are using it as a tool to prove the level of market interest, and how often municipalities undertake their own focus group testing to see if there really is a market for the developer's product?

Building on Mr. Mokhtar's car analogy, Ken Ferguson reminded the audience that the reason people did not want to buy small cars initially was because car manufacturers were taking big cars — not good cars — and making them smaller. It took at least 10 years before Japanese and European manufacturers realized that it was possible to make a good, small car in and of itself.

Mr. Ferguson then shared a recent clipping from the "Homes" section of a Toronto newspaper. The article is about a builder/developer who claims to have done customer "exit" surveys during model visits. The end product is supposed to reflect customer wants and needs and is characterized by lots up to one acre that back onto a conservation area and two-storey mansion-style, four- and five-bedroom homes that feature *Victorian* peaks, triple-pane turrets, a variety of window styles, and double front doors in the traditional *Georgian* style. Inside there is a combination of old and new, with extra high baseboards, hardwood floors, nine-foot ceilings, oak stairways, *Colonial* moulding on the archways, and decorative pillars and posts. The article makes no mention of the structure of the house, the energy-conservation features, the insulation, and that, Mr. Ferguson told the audience, is the real problem facing the industry.

Ray Essiambre noted the lack of pre-development consumer testing in Canada. Developers in the United States do up-front market research with focus groups; they know before they sell a house what the consumer wants.

DAY 2
Morning Session

■ Financing of Municipal Infrastructure ■

Moderator

Ted Bryk, Canadian Home Builders' Association

Speaker

Kenneth Whitwell, Senior Planning Consultant, IBI Group
Topic: *Public/Private Partnerships in Municipal Infrastructure*
(Background paper: *Public/Private Partnerships: Theory and Practice*)

A public/private partnership is a relationship in which a private-sector proponent either operates, builds, and/or finances an operation that otherwise would be considered a public responsibility. In theory (although not always in practice), there are a number of different types of partnerships.

Operate: This is an arrangement in which a government function — such as the operation of a sewage treatment plant or garbage collection — is contracted to a private firm. Because these types of projects are usually tendered, each private firm is under pressure to offer the most competitive price. Once a firm has been awarded a contract, it is obliged to make a profit. It does this by devising efficient and cost-effective ways to carry out the operation. For its part, the municipality pays a fixed price for the job and does not have the worries associated with carrying out the operation.

Lease and Operate: In this model, private-sector firms bid on a lease agreement to operate a government facility — a toll bridge, an airport, a water treatment system. Through user charges, the firm recoups the money required to run the facility, makes a profit, and pays the lease amount to the government agency. Regulations establish minimum service levels and the maximum amount of money that can be charged, but firms are free to find more effective ways of carrying out the service within these parameters.

Purchase and Operate: With the purchase and operate model, a private-sector firm purchases and operates a government facility. The firm is motivated to operate the facility cost-effectively and to find alternative sources of revenue to increase its profit. If the firm were to purchase a road, for example, it might set up a toll system to cover maintenance costs and pay the lease. Although the government agency has sold the facility, it continues to regulate fees and service levels.

Lease, Build, and Operate: The combination of several models produces a different kind of partnership in which a private-sector firm leases (or purchases) a facility, agrees to build an addition onto it, and then operates the facility afterward, hoping to use its expertise to generate a profit. The government receives money from the sale of the operation and is divested of the burden of additional capital investment. (This expense is borne by the private-sector firm.) A recent Canadian example of such an arrangement is Bombardier's purchase of the de Havilland aircraft production facility in Toronto. In this case, the private-sector firm makes a commitment to invest a certain amount of money in the operation and carry it on for a specified number of years. If the firm fails to meet either of these commitments, ownership reverts to the government.

Build: Another partnership model involves a simple turnkey operation. Instead of building a facility, such as a highway, the government tenders the job to a number of firms. The firms place fixed-price bids for the construction of the facility. The winning firm builds the facility and then turns it over to the government for the fixed price.

Build, Transfer, and Operate: Under this complex arrangement, a private-sector firm agrees to build and operate a facility that requires on-going operation, such as a sewage treatment plant or a school. The firm can transfer ownership to the government as soon as the facility is built (as in a build/transfer partnership), but continues to operate the facility for a fixed number of years. Alternatively, the firm can build and operate the facility for a fixed number of years and then transfer ownership to the government. The point at which the transfer of ownership occurs has no bearing on the operation of the facility, but it could affect other considerations (whether the property is tax-exempt, whether it meets certain provincial regulations, whether GST is paid, and whether it is owned by the firm or the government agency). Whatever the situation, the private-sector firm designs the facility to optimize operation efficiency.

Build and Operate: In this model, a private-sector firm builds and operates a privately-owned, government-regulated facility (such as a utility or telephone company).

Build and Transfer: The most common type of development industry partnership in Canada is one in which a private-sector firm builds a facility or a road and then hands it over to the municipality. Sometimes considered a "coerced" partnership, a good example of this kind of arrangement is when a developer is obliged to build roads and sidewalks and install sewers and electrical utilities in a new development, and then hand these over to the municipality.

Financial Arrangements: Private-sector firms can finance all or part of a facility — an arena, a community centre, or a library, for example — or put up money to ensure that a facility is built sooner rather than later. Municipalities can "coerce" or "induce" partnerships by threatening to turn down an application unless the private-sector firm agrees to make some sort of contribution to the facility.

Specific examples of these development partnerships can be found throughout Canada, including an ice arena and soccer pitch in Richmond, British Columbia; a library in Scarborough, Ontario; roads in the Waterloo region; and the operation of sewer and water facilities in Ottawa-Carleton

and Hamilton-Wentworth in Ontario and Sainte-Marie-de-Beauce in Quebec. But some of the most significant involve the construction of new schools.

In today's economic climate, school boards are finding it increasingly difficult to find the money to build new facilities. Development applications are being delayed, reduced in size and scope, or simply turned down. As a result, several municipalities have entered into creative partnership arrangements with the private sector that focus on new school construction.

Toronto Schools

In Toronto's St. Lawrence district, where land is at a premium, a public/private redevelopment scheme resulted in the construction of a new combined Catholic/public school. Separated by common areas that are shared with a nearby community centre, the schools are situated on the first two floors of a building that also features a residential and commercial component. Instead of a schoolyard, the children have the use of one acre of nearby Crombie Park. Unfortunately, maintenance responsibilities and liability issues between the various components were not fully considered at the time of development, and disagreements continue to this day.

When a second school was built in the St. Lawrence district, a much simpler operation was effected. Having learned from past experience, the school board decided to link different uses horizontally rather than vertically. In the end, three functions were constructed side by side: a school, a community centre, and a residential building. The liability and maintenance responsibilities of each function are clearly identified.

The school and community centre share swimming pools and gymnasiums — they have their own changerooms — and again, the school has the use of an adjacent park rather than a dedicated playground. Because the park is across the street from the school, an underground access tunnel links the two. Elevators were installed from the school to the tunnel and from the park to the tunnel in consideration of students with mobility difficulties.

In North York, a more "pure" public/private partnership was established to build a new school. There, the separate school board owned an old elementary school site. The area had changed to such an extent that what was really required was a high school specializing in the arts, not a primary school. Tridell, a major development company, owned land adjacent to the school and entered into a partnership agreement with the school board. The developer was to acquire the land, with the school, for $1. It would then design and build a high school using a mutually appointed architect. The new school and some extra land (to be used for parking and open space) would be transferred back to the school board. In exchange, Tridell was able to transfer the residential zoning that had been applied to the school property to the adjacent land and then build a larger apartment complex.

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Cumberland

Cumberland Township entered into a public/private partnership with the school board to create a joint community centre/high school at reduced construction and operating costs. The partners embarked on a very involved public participation process to gauge the kind of facility required and then determined what would be provided by each jurisdiction. The municipality transferred several acres of service land to the school board, which, in return, agreed to build larger gymnasiums and more auditorium facilities than it otherwise would have done. The municipality built a wave pool and swimming pool in the community centre and a new library that would be accessed by users in both the centre and school.

Pittsburgh Township

In Pittsburgh Township, where the separate school board wanted a new school and the municipality wanted a community centre, the two teamed up in the hopes of building a joint facility. At the time, a private developer — who happened to own a subdivision complete with a parcel of land designated for a school — approached the municipality with a proposal to build both facilities, as well as an apartment building for seniors. The developer would operate the building and either sell or turnkey the other facilities back to the municipality and the school board. Unfortunately, the negotiations were extremely difficult, especially since the Ministry of Education initially insisted that the new school go out to tender. Although the ministry eventually agreed to the builder's proposal, there was disquiet in the community because of the anticipated profit that would go to the developer. At the same time, the school board became concerned that the savings would not be as great as originally anticipated and that, since the property would be accessed by the public, it would have no control over site security. Negotiations dragged on for so long that eventually the school board went elsewhere to build a new school that would not be associated with a community facility or a housing development.

Peel Region

Confronted with a shortage of new school funding from the Ministry of Education and an "objectionable" proposed development, the Peel Region separate school board entered into a partnership with a private developer. Prior to the partnership arrangement, the school board had protested the new development with the Ontario Municipal Board. While the OMB did not agree to hold up the project, it did direct the developer to work with the school board to find a mutually agreeable solution.

One idea was to consolidate plans for three schools into two, thus freeing up the third parcel of land. Another was to strike a compromise between what the developer wanted (a three-storey school) and what the school board wanted (a single-storey facility). The compromise — a two-storey school — made additional land available to the developer. For its part, the developer agreed to accept only 75% of the purchase price of the land from the school board and to carry

the construction mortgage until such time as the Ministry of Education could advance the funds. (The anticipated wait is three years from the date the school opens.)

Nova Scotia

The Nova Scotia Department of Education is looking for a private consortium to design, build, and operate a school in Cape Breton that will feature state-of-the-art computer technology. To do so, the school must be designed to allow for constant upgrading. The bids of the three shortlisted private development proponents are alike in that they will rely on the resources of three external companies: a computer company, a construction company, and a property management company. The successful bidder will be responsible for building the school and operating it under a fixed rental agreement. The Cape Breton school board will be responsible for teachers' salaries, student selection, and certain operations, while the private development company will be responsible for cleaning and on-going maintenance for the duration of the contract.

Richmond

When the City of Richmond, British Columbia, wanted to build an arena with an ice rink and swimming pool, it was thwarted by a $30,000,000 estimated cost and the need for 14 acres of developable land. Fortunately, a private development company offered to build a four-rink arena on its own land and lease the facility to the municipality for $1 million a year over 25 years. The municipality accepted, and has in turn leased the arena to a community group. The community group is responsible for raising enough money to cover the facility's operating cost, which it does by renting ice time and operating a concessions booth. If the community group raises in excess of what is required to operate the arena, it keeps the first $25,000 and splits any additional funds with the municipality 25%/75%.

The arrangement keeps everybody happy: the community has four new ice rinks and a swimming pool; the development company used the arena to attract other industrial users to the area; and the municipality has a brand new service without any capital outlay.

The city has also entered into a public/private partnership with Honda Canada. When the company built a new plant in Richmond, it left an adjoining piece of land vacant to accommodate future expansion, which it used as a temporary recreational area for its employees. In response to a request from the city, Honda built a year-round public soccer pitch at a capital cost of $135,000. The company then gave the pitch to the municipality to use until the plant is ready to expand. The only cost to the municipality is annual maintenance ($6,000), any associated liability, and slight loss in taxation revenue: the municipality agreed to change the zoning on the land from industrial to recreational, which results in a $17,000 annual tax reduction for Honda. A similar agreement — for tennis courts — was reached with a neighbouring operation.

Scarborough

In Scarborough, Ontario, an agreement between that municipality and Tridell, a private developer, provides a good example of a "coerced" partnership. Tridell happened to be building a condominium development on one side of an open area (the other side is occupied by a shopping centre) close to a major intersection when the municipality began looking for a site for a new library. Because the estimated $500,000 to $900,000 construction cost for the library was unaffordable, the municipality approached the development company — which had applied for rezoning — with a proposal: donate a piece of land for the library and the request for rezoning will be granted. (Later on the municipality also asked the developer to contribute $500,000 toward the construction of the library.) The developer agreed, in part because he had expected that the municipality would demand something in exchange for the rezoning. More importantly, however, the developer regarded the deal as a way of dealing with public reaction to the proposed development. Indeed, no one appealed the application to the Ontario Municipal Board, which saved the developer at least $500,000 in legal fees and a minimum one-year delay. And the fact that a there is a library adjacent to the residential development is an attractive bonus to potential purchasers.

Waterloo Region

One of the most complex public/private Canadian partnerships was created in the Waterloo area. The City of Kitchener had approved several subdivisions in draft form, but had made final approval contingent on the construction of two arterial roads by the developer. While it is the region's responsibility to build such roads, financial cutbacks made it impossible to produce these two until 1999 and 2001. The region agreed to build the roads early if the developer would agree to pay for their cost and to be reimbursed by the Region for 90% of the cost (the portion coverable by development charges) in 1999 and 2001. This reimbursement would be through promissory notes issued to the developer. The municipality would save and use the money generated from development charges to reimburse the developer. Despite this guarantee, the developer was unable to obtain financing from any of the local banks. To get around this obstacle, the municipality offered to buy the developer's notes, at a discount — making 10.5% per year — and put this revenue into a sinking fund. Thus, the developer would have to cover the 10% of the total construction cost (which would have been paid out of local taxes), as well as the money the municipality will make in interest up to the year 1999. In essence, this means that the developer (or more accurately, the consumer) will be paying as much as $4,000 per unit to front-end these roads.

Edmonton

With respect to utilities, a number of municipalities near Edmonton entered into partnership with a utility company to construct a pipeline to bring in sufficient quantities of adequate drinking water. The utility company supplies the water and bills the customers directly. Since it already owned the land on which the water pipeline was built, there was no land cost

involved. As well, since the company was already supplying gas to customers and reading meters, the accounting system was already established.

Although this proposal eventually went through, it was not an easy process. As is sometimes the case in public/private partnerships, what happened with this particular arrangement is that the government reduced funding at the same time as it entered into a partnership agreement. Because the two happened simultaneously, consumers could blame the private company for cost increases. In this case, water rates are now twice as high as they are in adjacent municipalities. Making sure that consumers know their rates are going to go up regardless of whether or not the municipality enters into a partnership arrangement with a private company helps to alleviate some grumbling and mistrust.

Rockland

Sewage treatment operations can also benefit from public/private partnership arrangements. In Rockland, a small municipality just east of Ottawa, the sewage treatment plant recently reached capacity. A new sewage system was required to support new housing, but there was no money available for its construction. Development charges were not an option since existing residents would also benefit from construction of a new facility and should theoretically bear some of the cost (even though the municipality was of the opinion that the entire cost should be borne by new residents since they were the reason the facility was required).

A consortium of Canadian waterworks and private developers in the area who owned land that could not be developed approached the municipality with a proposal that they would construct a plant (to the tune of about $12.6 million) and operate it for up to 20 years. The municipality would collect a hook-up charge from every new housing unit and turn that money over to the consortium. The money collected should equal $12.6 million. Divided by 3,500 units, this would mean that each household would be responsible for $3,600. (This amount would increase annually by 12% to account for the carrying costs of the loan.)

Unfortunately, the per household cost could only be justified if all 3,500 houses were sold in the first five years or so. In a slow housing market, where it might take upwards of 10 years to sell the entire development, the hook-up charge increasingly becomes a disincentive to further development. At the end of 20 years, the municipality would cease to collect any further hook-up charges. It would then own the facility, and any outstanding loss would be borne by the consortium.

In this case, the municipality would have had to co-sign the agreement to secure the construction loan. It was concerned that it could be held liable if the facility was underfunded and attempted to get various mortgages on the private land as compensation in the event the facility could not proceed. Understandably, the developers were uncomfortable with this idea, and the project failed to proceed.

Ottawa-Carleton

A sewage treatment system in Ottawa-Carleton involved the construction of new facilities and the establishment of a computerized operation. To help with the changeover, the municipality brought in a private firm with suitable expertise to operate the plant for five years. During this time, municipal and regional employees would be trained. After the five-year contract period has expired, the facility would be either privatized or run by the region.

Although delays were anticipated, there have been fewer than expected. As well, the maintenance end of the operation is less onerous than was originally predicted. This has resulted in greater profit levels for the private-sector firm — and more grumbling from the public sector. Currently, the Region is of the mind that it could operate the facility at least as cheaply as the private-sector firm.

Sainte-Marie-de-Beauce

Sainte-Marie-de-Beauce is a small Quebec municipality facing a problem that is all too familiar to many of today's smaller municipalities: how to operate complex water or sewage treatment plants that require the attention of skilled and expert staff? It is simply not economical for these municipalities to hire all the staff they require. A private firm that operates a number of sewage or water treatment plants in the same area, however, can rotate staff as required. With more knowledge of these new facilities and technological trends, it can operate the plant more cost-effectively than can the municipality.

Hamilton-Wentworth

The operation of Hamilton-Wentworth's sewage treatment plant represents one of the most complex partnership agreements in Canada. Philip Utilities is a firm that sells the technology and skills required to operate sophisticated sewage treatment facilities inexpensively and efficiently to municipalities around the world. For marketing purposes, the company needed a plant to use as a demonstration project. Hamilton-Wentworth — with its 2020 vision as a leader in environmentally clean industries — was the perfect host candidate. Accordingly, Philips agreed to move its head office to Hamilton, invest money in other research facilities, maintain municipal staff for at least two years with the same benefits and security, and hire about 100 additional staff. In return, the municipality gave Philips the plant to operate (at an annual savings of $700,000). Now renowned as an "expert" location, Hamilton-Wentworth is able to attract and keep environmental industries.

To summarize, some of the benefits of public/private partnerships are listed below:

- because of the economies of scale, small municipalities in particular have much to gain from entering into public/private partnerships (private-sector firms generally have expertise in a particular area, unlike municipalities — which are more adept at handling a full range of functions — and they are generally more focused and rely on a leaner staff base);

- capital cost savings result when more facilities or functions are clustered together on one piece of land (these include land, heating and air conditioning, electrical distribution, and ancillary costs associated with sharing support facilities);
- public savings are also generated through the private use of public-sector development rights (if the public sector is able to transfer its development rights on adjacent or nearby properties to a developer, that developer can use those rights to create larger buildings and more units and more offices;
- public savings are also realized when private partners derive external benefits: demonstration, employee morale, and promotion. (The demonstration project in Hamilton-Wentworth and the Honda plant in Richmond, British Columbia, are two examples of this);
- well-motivated public-sector staff can be as efficient as a profit-oriented private-sector staff (however, maintaining the level of motivation is a problem, since public-sector staff are driven by a sense of community betterment rather than job loss and profit-making. The problem lies, however, in keeping the public-sector staff motivated);
- some partnerships might not reduce costs but simply transfer them from the whole community (through taxes) to new residents (through development fees);
- public/private partnerships for the provision of public roads, sewers, and sidewalks are the most common arrangement; and
- for the private sector, time is money (which means that to survive, activities undertaken by the private sector must be carried out efficiently, with quick decisions and little hierarchy). In the public sector, where there are more levels of reporting, the time factor is extremely costly — decisions take longer but are more thoroughly conceived.

Panelist

Kennedy Self, Director of Community Planning, City of Scarborough
Topic: *The Municipal Perspective*

Although it might sound acutely obvious, a key ingredient in any public/private partnership is the public: the people who live or will be living in the community. The public is an integral part of everything a municipality tries to achieve and is a key ingredient in advancing any public/private partnership that generates new or better ways of building a municipality. Failure to bring the public on-side generally spells failure for a project.

Public buy-in is critical, and its effects are far-reaching and not necessarily measurable in pure monetary terms. A good example of this is the Scarborough City Centre. Built on 200 acres next door to Highway 401, the site is the geographic centre of the community.

South of the City Centre is a large, low-density area, featuring '60s- and '70s-style, 50- by 100-foot family housing. Before the centre was created, the city had a vision that the lands near this low-density area should be developed for the centre. When a developer applied to build a large, regional shopping centre, negotiations began to satisfy both the developer and the city. Although the public was not on-side at the outset, it was pleased with the end product. The developer had the land subdivided and put in the roads and sewers before handing it over to the city.

As well, the developer donated a piece of land to the city on which it could build a Civic Centre. At the same time, the light rapid transit line was being extended into Scarborough through an agreement between the city, Metro Toronto, the Toronto Transit Commission, and the province. With public input, visioning exercises began to determine what the City Centre would look like, and at least commercially, the area began to grow.

There was still one element missing, however — residential development. Fortunately, Tridell came along just as the Planning Department had succeeded (after a five-year effort) in selling its vision to residents living south of the City Centre. In fact, the president of the community association had stood up at a public meeting and offered his support for the proposal, despite its higher-than-usual densities.

The city managed to bring Tridell on board using Section 36 of the Ontario Planning Act. Through bonussing, Tridell was "coerced" into providing design standards in excess of its norm for condominium units. As well, Tridell was persuaded to contribute transit and daycare facilities and a number of extra landscaping features. This was a calculated risk on the developer's part: it believed that the costs for the "extras" would be recovered through the sale of the condominium units — and that the extra feature would help to sell the units.

This type of partnership is often referred to as "let's make a deal planning." But the plan would not have been feasible had it not been based on sound planning principles. Questions such as "will it work?" and "does it fit?" had to be answered before any persuasion could even be entertained.

A similar approach has been used for other projects throughout the city. One of the reasons the use of partnerships has been so successful in Scarborough — the city has managed to "coerce" a number of improvements (transit, community facilities, a library, walkways, and landscaping) — is that the bonussing elements of the Planning Act have been entrenched in the city's municipal by-laws.

Recently, Scarborough joined forces with a private developer to create 2,600 medium- to high-density housing units with rapid transit access. Because the city did not have the budget to make necessary improvements in support of these new residential units, the developer was "forced" to make certain improvements to the transit and road systems and to the sewer and water networks before the development was approved. Although the proposal was widely supported in the community, one group took it to the Ontario Municipal Board. As a result, the original project was not approved. However, the developer has now put in a proposal for a downscaled version of the development that appears to be acceptable to all community groups.

Included in the revamped proposal is the construction of a Chinese cultural centre, which will benefit the entire city. The centre has been made possible by a partnership between the Chinese cultural group, the city, the province, and the developer. The developer will build the centre on land that it has donated to the city. As well, the developer has agreed to foot the bill for a separate school site and building.

To create successful public/private partnerships, it is important to motivate the public sector. One of the biggest obstacles in getting things done and in taking risks is the resistance to change exhibited by many bureaucratic regional planning departments. Planners do not like to talk about "good deals." But innovation is dependent on the quick transformation of an application into a building permit, and there is an opportunity for partnership in every development.

With the use of "coersion," municipalities are demanding their piece of the developer's profit. While this could prove to be a stumbling block to the formation of successful partnerships, the reality is that municipalities do not have the money to make improvements in the short term. Everyone has to work together to make things happen, and if a development company wants in, particularly in a redevelopment situation, it has to be willing to contribute financially.

The importance of ensuring that all planning is good planning in itself cannot be overemphasized. The final product of any development must be a good deal for the municipality and the people who live and work in it. For that, municipal planners must try to make their role an integral part of a public/private partnership, not an obstacle.

Panelist

Robert Cumming, Vice-President, River Oaks Group
Topic: *The Homebuilder's Perspective*

In general, the River Oaks Group would prefer not to be involved in infrastructure issues. The fact that it is, is indicative of three things: that infrastructure provision is a critical constraint to the building industry; that this constraint affects the industry (both tangibly and financially); and that the current system of infrastructure delivery is not working as well as it should. The most serious problem is that in many municipalities water and wastewater infrastructure is not in place when the developer is ready to proceed. This has a negative financial impact on a project: development is brought to a standstill and, because the developer is responsible for the interest charges on its initial land and approval investment, the wait costs money. Thus, any mechanism that hastens the delivery of infrastructure and allows development to proceed will be eagerly investigated.

As an analogy, consider sitting in your banker's taxi. The meter is running, whether you are standing still or moving. It is difficult to overstate the motivational impact that this situation has on a developer's desire to find solutions to the infrastructure problem.

The Bob Rae government has had a considerable effect on Ontario's municipalities and the infrastructure issue, primarily because it has created a scarcity of municipal capital. Today when I look out the window of my banker's taxi, I see the Chief Administrative Officer of my municipality sitting in a taxi driven by Bob Rae. We both look nervous and pensive, but for the first time, we are both coming from and going in the same direction: we are both looking for the same solutions to the same infrastructure problems.

Public/private partnerships sound like a nice solution, but they are not a new concept. Developers have been involved on the financial side of these arrangements for many years, usually through front-ending agreements for large plant-oriented facilities. What is new, however, is the involvement of municipalities in much more than just plant development. Design, construction, and facility management are common functions in the municipal arena. Shrewd negotiators even secure user-pay tariffs. But is this just a little too good to be true?

Certainly, it is not the solution to the municipal infrastructure financing crisis. It is a tool that in the correct circumstances will provide eleventh-hour arrangements for moving development forward. But the crisis is much bigger than this. It encompasses all infrastructure associated with development, including high lot prices (which prevent the reduction of housing sale prices that is needed to kick-start the recovery of the housing industry). According to some statistics, 75% of the cost of producing a serviced lot is a direct result of the infrastructure requirement. This includes the cost of internal servicing, development charges, consultant design, and management services.

The question that begs to be answered is whether municipalities are spending the pool of infrastructure optimally? Two municipal impact studies associated with the River Oaks Group's new urbanism subdivisions provide certain insights into this issue.

There is little appreciation of the life-cycle cost of infrastructure or the total cash flow associated with an infrastructure item over its life. These studies indicate that the replacement cost of infrastructure is highly significant and in some ways more important than maintenance costs. Historically in Ontario, the high level of subsidy available for the construction, maintenance, and replacement of infrastructure has prevented this from becoming an issue. Why conserve, when someone else pays the bills?

As well, excessive subsidy has created an artificial environment in which service standards and levels of service are greatly affected by the short-term focus on minimizing or eliminating maintenance costs and the influence of the vocal minority. Despite the fact that the rationale for many standards and levels of service are poorly or narrowly understood, they are well defended by municipal staff. Changing the subsidy structure will act as a catalyst for an examination of the true economic cost of infrastructure and a review of the rationale for infrastructure standards.

However, changes in infrastructure standards do not necessarily mean a reduction in levels of service. Indeed, it is reasonable to expect that a thorough economic analysis would suggest that some levels of service increase, despit an overall reduction in infrastructure expenditure. This would be a welcome change because it would allow several things to happen:

- with fewer dollars spent, the tension over financing constraints would be lessened;
- municipalities would have the capacity to largely fund their own projects;
- certain expenditure constraints could be passed back to developers to allow for reduced lot prices; and
- constraints on major plant facilities could be lessened, allowing development to proceed on a market-oriented basis (a crucial element in passing on cost savings to homebuyers).

But how can this be achieved? Where municipalities are not progressive in their approach to infrastructure, attitude is the main barrier to progress. The use of money and education are two effective ways to change attitude. And at least the money aspect is simple: the province must change its subsidy program. The education component will require a great deal of effort and a reasonable amount of money. The people in this room represent a tremendous resource in advancing this issue. Using the people at this conference as advocates, a thoughtful but uncomplicated report presented to municipal staff on the true economic costs associated with infrastructure would be helpful. If this report is to shape attitudes, it should be written from the municipal perspective. How do municipalities regard their infrastructure? Specifically, it should focus on short- and long-term cash flow and include an analysis of alternative design standards. It should not talk about urban form. The more prestigious the organization that presents this report, the more success it will have.

A change in municipal attitude will result in new initiatives to conserve scarce municipal financial resources, to maintain and create construction industry jobs, and to deliver more affordable housing projects. Through this process, the economic benefits of conservation will be made highly visible. It is astonishing to think that a number of municipalities that are experiencing severe water and wastewater infrastructure capacity constraints have not implemented a water metering program. The use of metering would free up a latent infrastructure capacity worth millions of dollars — one that is accessible only through

conservation. Add this value to the economic boost of continued development (and thus employment) and the net worth of metering increases dramatically. It is an item that should be at the top of every political agenda. It is a perfect solution: with virtually no up-front costs, a municipality can generate millions of dollars in development and jobs.

A new approach to infrastructure management would also allow for flexibility in the way planning innovations address social, urban use, and environmental priorities. There is much more to be considered than just new and old urbanism. Bringing the homebuilding industry on-side in support of municipal reform is what public/private partnerships are all about.

Panelist

Enid Slack, President, Enid Slack Consulting Inc.
Topic: *An Economic and Market Efficiency Perspective*

In June 1992, CMHC held a conference on infrastructure that featured one session on the issue of financing municipal infrastructure. As a member of that particular panel, I talked about some of the traditional sources of financing infrastructure (property taxes, user fees, and borrowing), as well as some of the newer methods. The traditional methods were failing: property taxes were rising everywhere despite mounting pressure to keep them down; user fees for government services were met with resistance; and borrowing was not considered a palatable option.

One solution was to involve the private sector in the provision or financing of infrastructure, especially through development charges and public/private partnerships. At that time there was a great deal of talk about development charges, but little mention of public/private partnerships. The conclusion of that discussion was that partnership arrangements needed to be examined on a case-by-case basis (as Ken Whitwell has just done).

Three years later, I have been asked to focus on the economic and market efficiency aspects of public/private partnerships. To frame my talk, I will be focussing on three questions:

- Do public/private partnerships lead to greater competition in the marketplace? (Advantages usually associated with partnerships relate to efficiency considerations: cost savings, greater consumer choice, better service delivery. But studies indicate that efficiency is not inherent to the private sector, and that competition leads to these efficiencies);
- Who benefits and who pays when public/private partnerships are used? (According to economic theory, efficiency is always greater when those who benefit pay the costs. Is the link between costs and benefits greater when services are delivered through public/private partnerships rather than the public sector alone?); and
- Does it matter which sector does the borrowing? (Many public/private partnerships seem to boil down to a transfer of the borrowing responsibility from the public to the private sector).

As I have just mentioned, cost savings in the private sector are the result of competition, which produces such properties as greater choice, better service delivery, and more efficient outcomes. But privatization does not necessarily lead to greater competition; and greater competition does not necessarily require privatization. There can be barriers to competition, and this can mean that privatization does not lead to cost reductions and better service. In some cases, for example — especially in small towns and rural areas — there are too few proponents to compete. Situations also arise in which suppliers tacitly agree to collude if they are going to bid on a government contract: in other words, they agree to bid more on public-sector contracts than they do on private-sector contracts. Where there is collusion, there is no competition.

While economies of scale mean that one municipality might only have one large sewage treatment plant, the contract can still be tendered competitively. But at the end of the day, only one firm will be providing the service over a large area. Where large capital outlays are required, the end result is a monopoly. Competition for services that do not require vast up-front capital — garbage collection, for example — is more likely.

Greater competition does not require privatization. It is possible to introduce competition into the public sector. In a British Columbia study that compared the solid waste collection practices of two municipalities in the Greater Vancouver Regional District, one municipality was operating with municipal employees, the other contracted out the job through periodic competitions. Both experienced increases in productivity, due in large part to the competitive spirit.

Similar examples exist in the United States. Certain cities in California, for example, contract out many services, not only to private firms but also to each other. The result is increased competition within and between cities, as municipalities compete with each other and with the private sector and private-sector firms compete among themselves. The cities that do contract out experience lower costs.

Another argument for privatization is that certain economies of scale are exclusive to the private sector. For example, the private sector is not confined in its operations by jurisdicational boundaries. To a certain extent, however, municipalities can overcome geographic constraints by selling services to other municipalities and creating inter-municipal co-operation.

With regard to who benefits and who pays, efficiency is more likely to be realized when there is a direct link between payment for service and benefits received. For example, where water bills are based on consumption, people tend to use less water. A direct link between payment made and service received ensures that the end user will make better economic decisions. This link is most easily achieved with goods provided by the private sector because an explicit price is charged for the service. In the case of goods provided by the government, the consumer pays a hidden cost. Unless there is a user fee, there is no direct link between the price paid and the value received. Although the government could charge users directly for a number of services, consumers seem to be more accepting of private-sector user fees.

The use of development charges is one example where benefits are directly related to costs. Studies indicate that these charges — which are largely passed on to new homebuyers — are sensible, since in effect growth is paying for itself. The charges show up in the price of the house, which seems reasonable since it is the new homebuyer who benefits from the use of the infrastructure. The new homeowner also pays a fee for services. Existing residents are not held responsible for any costs associated with the new development. However, new homebuyers also pay property taxes, part of which are used to pay off the debt for previous capital infrastructure projects. In some municipalities new homebuyers are also paying a capital levy for future expenditures. While it is fair to expect growth to pay for itself, it is not fair to expect it to pay for past and future growth as well. By paying development charges, property taxes, and user fees, sometimes new homeowners are paying for more than their fair share.

In some cases, governments do not want to link benefits and costs. They may have other objectives: to provide services that involve some form of redistribution, for example. In fact, public production may be used as a way to discriminate among potential users. When the private sector comes in and takes over these services, it will remove the redistribution component, and these costs might have to be increased in other areas.

Should governments provide people with subsidies through the services it provides? If there is no user fee for water, for example, then in essence the government is subsidizing the use of water. An argument can be made that because water is a fundamental need, lower-income earners should not have to pay for it. But water subsidies primarily benefit high-income earners: they are the ones who have more cars to wash, more toilets to flush, more lawn to water, and larger swimming pools to fill. The government is, in effect, subsidizing the wrong group of people.

And lastly, does it matter who borrows? Looking at the studies that have been done, it would appear that public/private partnerships do not always lead to cost savings or increased competition. By relieving municipalities from the need to borrow money, however, they do facilitate development. But is this efficient? In most cases, it is probably cheaper for municipalities to borrow money (many of which are still well below their debt limits). Thus, from an efficiency point of view, the transfer of the obiligation to borrow is not in itself a good reason for entering into a public/private partnership.

Public/private partnerships are not a panacea. Yet, there are times when they do serve a useful purpose in increasing competition, saving money, delivering better services, and providing more consumer choice. With a little work, a little co-operation and a little competition, however, the public sector could operate with greater efficiency and cost-effectiveness.

Ottawa — March 22-23, 1995

Roundtable Discussion

Chris Gates, of REIC Consulting, asked Enid Slack how to address public concern about user-fee charges for various infrastructure systems, in light of the fact that many consumers view these types of charges as a municipal tax grab?

In response, Enid Slack agreed that while it is often easier for the private sector to charge user fees because it is expected, people are beginning to realize that governments are financially pressed. Unless they want to see their taxes continue to increase, they will have to accept user fees. There is growing support for the idea that people should pay for what they get and that taxpayers should not have to subsidize the consumption of others. Implementing user fees gradually over a five-year period might make them more palatable. Ms. Slack also remarked that phone bills are not viewed as a type of tax but as a service that people pay for, and that it is time we started moving in the same direction with water, sewer charges, and even waste disposal.

Colin Leech, from the Ottawa-Carleton Regional Transit Commission and representing the Canadian Urban Transit Association, made several comments relating to transit. Transit is a "soft service" and with the exception of the small visible part of the service — buying a new bus, building sidewalks, putting up shelters, or building a rapid transit station — people rarely think about it. But there are some very important invisible aspects to transit provision, and one of these relates to community design. On-going operating costs constitute, by far, the major cost of providing transit service, but many municipalities give little thought to design considerations.

In Ottawa-Carleton, transit considerations enter into the initial stages of project design and development. When a new subdivision is being planned, it is important to consider such things as the layout of collector road systems so that an efficient and effective transit service through the community can be provided over the long term. Residential streets must be arranged so that residents have ready access to transit service. And, as a last resort, extra walkways must be installed to lead people to public transit systems in the absence of roads. The orientation of commercial buildings, access roads, and pedestrian facilities, among others, are also important considerations. The end result is a better product with lower operating costs and better opportunities for passenger use.

Ken Whitwell, of the IBI Group, agreed with Mr. Leech about the importance in laying out communities and deciding in advance where each component will be situated. This allows for transportation planning and the maximizing of transit use. Planning a community around transportation can make transit more self-supporting and less costly. In the City of Scarborough, for example, density is being increased along the line in advance of a subway extension. Land use and transportation must be considered in tandem. In the final analysis, up-front consideration will save the municipality in terms of road infrastructure costs.

Don Tate, of Environment Canada, shared some data with the group concerning water rates. On average, consumers pay less than $20 per month for water — much less than they pay for cable TV and many other municipal services. If this water rate were doubled (and a 60% sewer

surcharge applied), we could afford to finance the rehabilitation of Canada's entire infrastructure system.

Enid Slack said it is because water and wastewater were not priced correctly in the past that we cannot afford to replace our aging infrastructure today.

Robert Cumming, of the River Oaks Group, commented that when metering is introduced in a community, it automatically creates a conservation benefit. Metering leads to excess capacity, which is very valuable, and should be sold to the developers who are going to use it. This revenue can then be passed back to those people who are fearful that a rate increase is equivalent to an additional tax. Thus, it is possible to introduce metering without upsetting the general public.

In response to a query for clarification from moderator Ted Bryk, Don Tate said that his department had examined projected capital costs from across the country to come up with its figures. Municipal infrastructure already in the ground is estimated to be worth $110 billion. If depreciated over 40 years, the corresponding average replacement rate is 2.5% per year. This figure was doubled to make up for lost rehabilitation time. Thus, the rehabilitation cost of this infrastructure was estimated at about $5.5 billion a year, which can be covered by a doubling of Canadian water rates and a 60% sewer surcharge. The idea is to generate a sustainable water system for the entire country. There are places in this country that are paying less than $10 a month for water supplies. Not surprisingly, those places are the ones complaining the loudest and the longest about not having money for infrastructure.

Hani Mokhtar, of the Office of Infrastructure — Treasury Board of Canada, said that one of the greatest problems in understanding the true cost of infrastructure is municipal bookkeeping. Many people will resist user fees for water charges because they feel they should receive a commensurate reduction in municipal taxes. Opening the books to the public and showing people how much money municipalities are spending on water systems might help to reduce any public reluctance.

Residents in Ottawa-Carleton are on metered water and do pay a sewer surcharge, but many consumers are unsure as to whether they are being over- or under-charged. A simple ledger system could effectively illustrate how much the municipality has spent and how much it has collected. Mr. Mokhtar said that, as a resident, he has a number of unanswered questions. Are other municipal services being subsidized? Are the rates he is paying correct? Will the money collected be sufficient to cover replacement costs 25 years down the road or will he receive a whopping capital cost surcharge? Although that information might be recorded in the general budget (which is open to public scrutiny), it is not readily available to the average consumer, which makes people reluctant to accept new ideas.

In response, Ken Whitwell said that it has been argued that municipalities should behave like commercial operations and put their various functions within separate boundary lines so that it would be easier to understand the costs associated with each operation. It is impossible to compare a municipal operation to a private operation unless these costs are made explicit.

Perhaps municipalities like Ottawa-Carleton, which are essentially corporations in their role as infrastructure provider, should enumerate all of the costs, expenses, and revenues borne by the corporation. A yearly statement could be sent to taxpayers so that the end users can see how much money is being generated for a sinking fund. This commercialization and compartmentalization of operations would make the overall picture much clearer to both consumers and providers.

Ken MacLeod, of the British Columbia Ministry of Municipal Affairs, remarked on the dilemma of distinguishing between partnership proposals that have intrinsic merit and those that are merely ways to get around rules or processes. While documents like the one presented by Ken Whitwell are useful, their strength is in illustrating the situation, not providing a framework to guide decisions. Municipalities need something that will help them to deal with some of the key public finance theory questions raised by Enid Slack, as well as a checklist system that will allow them to determine what decision works under what conditions.

As an example, Mr. MacLeod referred to the fact that municipalities not only want partnerships, but also to remain eligible for infrastructure grants. The worst-case scenario is one in which the grant is still offered (because it is for the facility and exists independent of management structure) and the subsidy is compounded through the federal income tax system to the point that it ends up as a visible profit in the developer's pocket.

Mr. MacLeod echoed Ms. Slack when he told that audience that if the purpose of public/private partnerships is to achieve economies of scale, the alternatives of inter-municipal or regional supply of services (at least in British Columbia) are conceptually equal, if not superior.

Mr. Whitwell agreed that much work needs to be done in looking at financing principles and such issues as grants, cost allowances, GST payments, and property taxation. While these issues are relatively straightforward when there is a clear demarcation between public and private involvement, the lines are blurred once partnerships are entered into the equation. Are these employees doing the same work? Are they still covered by the same pension plan? Is the same GST payable? And what happens when the subsidy ends up in the private-sector's books and the public begins to complain?

Mr. Whitwell also spoke about the number of subsidies received by various municipalities and how they are derived. Municipalities are reluctant to enter into creative partnership arrangements because they are afraid of losing their subsidies. Although they would like to get involved in alternative solutions, higher-level grants or subsidies are always tied to conditions that do not necessarily marry with the ideas of the various partners.

Enid Slack noted that it is very difficult to determine what exactly can be considered a public/private partnership, in the true sense of the word. And sorting out the pros and cons of the different arrangements is dependent on understanding the topology of the different types. Until we have a real understanding of what constitutes a public/private partnership, we cannot begin to entertain such questions as "what will happen to municipal staff?; to service delivery?" The issues and results will differ from one type to another.

Robert Cumming added that subsidies need to be maintained but that provincial objectives could be widened for easier compliance.

Roger Mareschal posed a number of questions to the panelists. Enid Slack was asked whether transferring the responsibility for borrowing was not a positive event since the upfront costs are ultimately paid by the consumer and not the community-at-large in a user-pay kind of scheme and since it does free up a municipality's borrowing capacity. Ken Whitwell was asked why joint venture organizations were not considered a public/private partnership. Known as Régie in Europe, these semi-public organizations manage natural gas, water, and other utilities independently on a commercial basis. These organizations operate in a more commercial or business environment, which would satisfy the public requirement for more information and less government intervention.

Enid Slack replied that transferring the borrowing responsibility and putting the costs onto the developer and, by extension, the new homeowner, was just another way to make new growth pay for itself. Because municipalities can generally borrow more cheaply than developers — and certainly more cheaply than new homebuyers — forcing developers to borrow raises the price of housing. Because the house is more expensive, the consumer has to let the house go or take out a bigger mortgage. It is simply not the most efficient way of borrowing money. New homeowners should, however, pay for some portion of the services they receive. It is a trade-off, really.

In his response, Ken Whitwell noted the tremendous complexity and variety of partnership models and acknowledged that the joint venture should certainly be added to the list. With regard to transferring expenses from the general taxpayer to the new homebuyer, the natural next step is to question the legitimate role of government. If facilities are handled on a user-pay basis, then the government does not have to provide them at all. It simply needs to ensure that they are provided and to regulate their provision. Infrastructure provision could be privatized. So is there any function left for the government to perform at the local level? Perhaps to create an infrastructure plan that could be tendered out to the private sector? Can everything be privatized? Can all services be operated according to the user-pay principle? What about the people who cannot afford to pay and the question of direct subsidy through means testing? The idea is workable, but it flies in the face of the principles of universality. With the implementation of a strict user-pay/direct subsidy system, is there any role left for government?

One participant said that the government would still have a legislative and judicial role to play, but agreed that governments don't have to be into operations and can only direct universality.

Another participant argued that this was not necessarily the case. Referring to the CRTC and telephone service, it was noted that the rates are set according to the kind and condition of service required and that these rates are legislated. There is nothing in the legislation, however, that protects the person who needs a telephone but cannot afford one. There must be some kind of subsidy system in place that leads to means testing and the demise of universality. But with the user-pay principle, everything is above board. There are no hidden subsidies. Everyone

knows what everything costs. Private firms handle all the operations, and the government simply acts as a rule-setter and referee, ensuring that things run properly.

As a clarification, Enid Slack said that local governments provide three different kinds of goods. Private goods, which can be priced according to market demand, can and should be subject to user fees. Redistributed goods, like education and welfare, should really be a provincial responsibility. And then there is the middle group — parks, roads, and other goods with "collective" benefits. These are not private goods like water and sewers; nor are they redistributed goods. Even with a user-pay system, the government would still be responsible for this middle group, which could perhaps be funded through property taxes.

It is important not to confuse local government production with provision, said Ms. Slack. Provision is a function of responsibility: it is up to the local government to make sure that certain services are provided. Production, on the other hand, has more to do with the nuts and bolts: actual road and sewage treatment plant construction and operation. Local governments can provide a service without actually producing it, even within public/private partnership arrangements.

Hok-Lin Leung, of Queen's University, asked the panel about the Build/Own/Transfer (BOT) model and the difficulty of securing front-end financing, which is the prime municipal motivator for entering into this kind of public/private partnership. The private sector fronts the money and makes a profit during the first so many years of operation, but the eventual transfer back to the public sector is critical. There is a general feeling that the public should ultimately own and operate its own facilities.

Using an analogy, Mr. Leung compared the situation to a marriage of convenience, but with a twist. There is a marriage contract between the partners which stipulates that separation will occur after 20 years, with the custody of the children going to the public partner. During those first 20 years, the public partner plays a wait-and-see game. It has no idea what kind or quality of children it will produce, and this can be a problem: the public is a fickle creature. In some cases, the public cannot wait to get custody of the children; in other cases, the private partner cannot wait to hand them over. When the public partner enters into the marriage agreement, it does so for money. But 20 years later things can look very different. Can the public partner afford to keep the children? Can it care for them?

Mr. Leung was curious to see if the panel felt there should be certain conditions established under which the terms or timeframe of the transfer should be reconsidered? There is a fair degree of cushioning built into the BOT model. While the developer hopes to get in and make a quick profit in the first, say, 12 years (with the remaining eight years of the contract simply providing the icing on the cake), it does have a full 20 years to recoup at least some money. But it is very difficult to predict the future, especially in a changing market situation, and the element of risk for both partners is always present.

Moderator Ted Bryk noted that the willingness to take risks in the development industry seems to hinge on the promise of growth, and "growth insurance" is simply not available.

Responding to Mr. Leung, Ken Whitwell agreed that the uncertainties involved in a build/operate/transfer partnership, not to mention its duration, make it necessary for the developer to build in a healthy profit margin to compensate for future risk. The most instructive example, said Mr. Whitwell, is Highway 407, which was originally intended as a BOT arrangement. Originally, the developer was to find the front money, build the road, and operate it for a certain number of years. The developer was going to collect tolls to recover the cost of the road. But the developer was concerned that as traffic congestion built up on alternative roads — which would force people to take the 407 — the government would be under increasing pressure to improve those alternative roads to relieve congestion. This would, of course, eliminate the market for Highway 407. To compensate for this, the developer had to build in enough profit to account for all sorts of unknowns, to the point where the size of the profit margin made the scheme unacceptable to the province. In the end, the operation was divided into two different contracts: the first contract is for the private sector to build the highway for a fixed fee (the government itself will pay for construction); and the second contract deals strictly with the highway's operation over a specified period. By breaking down one large contract into several smaller ones, the risk is distributed and the cost is decreased.

Enid Slack added that several studies have been done regarding BOT partnerships and the risks involved for the private sector. The biggest associated risk is that the government will change the regulations and rules somewhere down the road. The developer knows this and builds a contingency into the initial proposal, making it a more expensive project.

Mr. Leung suggested that such facilities operate as franchises that will be available for purchase at some time in the future.

Mr. Whitwell agreed and remarked that he was not sure why it is necessary for the municipality to acquire the facility at the end of 25 years. Essentially it is just a selling tool for politicians. They can tell the public that the private sector is going to build and operate the facility for 25 years and then give it to the public for nothing. Governments like people to think that they are getting something for nothing — which is, of course, what they will get: a facility that is 25 years old and just ready for extensive renewal investment. The private sector has made its profit and walks away, in many cases leaving the government with a lemon. Where is the benefit? Breaking the contract down into smaller parcels of shorter duration is one way to reduce risks. Interested parties bid on the contracts with full knowledge of the situation.

Anne Beaumont, from the Ontario Ministry of Housing, expressed concern that all of the talk around the table regarding public/private partnerships focused on the conventional "blackmail" system, despite the fact that a new breed of partnerships is beginning to emerge. These partnerships are based on a business relationship and are entered into voluntarily. For this type of arrangement to work, some of the old rules must be re-examined, especially those developed over the last few decades of prosperity. One area of particular concern is the provision of schools and parks, alluded to in several examples by Ken Whitwell. Ms. Beaumont asked the panel if there had been any kind of systematic re-examination of housing-related infrastructure, particularly the size and scale of school sites and parks, which eventually cost the homeowner dearly?

Mr. Whitwell replied that he was not aware of any real study to this effect. Much of our examination of alternative development standards, he said, has focused on such issues as road right-of-ways while the larger issues — like school size — have receive little or no attention. Mr. Whitwell was, however, involved in a study for the Greater Toronto Area in which schools have increased in number and decreased in size to accommodate fewer students but more special purposes. The schoolyards are bigger, however, because they must incorporate bus turn-offs and a parking lot that will hold not only the vehicles of teachers but also those of students.

The same sort of pattern is emerging with regard to parks. Our standards are higher, and we now require such things as stormwater detention ponds — which, of course, cannot be located in a park but on a separate piece of land. On top of this, new policies in the Planning Act stipulate that woodlots and drainage ditches, which are considered watercourses if they have water in them for at least one week each year, must be protected. Because development must be set back from these areas, the number of land takings by public agents is continuously increasing. This not only raises the cost of development but also contributes to sprawl and a more intensive development pattern.

Robert Cumming noted that the Peel Region school boards produced a study in which possible changes to school design as well as the incorporation of these changes in public/private land development initiatives where examined. Developers appear to have an interest in becoming involved in school board issues, and there are a number of mechanisms associated with land use and standards that will be beneficial. The problem, said Mr. Cumming, is that there is currently no real money to be made in the development industry, and involvement puts the private developer in a loss situation. Unless there is some sort of physical exchange that will allow developers to generate funds and offset and compensate for the costs involved with school board involvement, these partnerships will not come to pass.

Referring back to the Scarborough City Centre and its position in the middle of a large industrial area, Kennedy Self noted that school boards are reluctant to relax certain of their requirements that would make non-conventional development a more viable option.

With regard to the idea that reducing standards does not necessarily imply reduced levels of service, Guy Félio (National Research Council Canada), asked the panel if there was a definition of "level of service?" He suggested that there are basically two levels of service: acceptable and affordable.

Mr. Cumming responded that during "new urbanism" negotiations with two municipalities, the idea that a reduction in standards was not equated with a reduction in service was implicit. Instead, changing standards was equated with improvement. For example, we can change our standards to allow us to incorporate modern technology that will not only maintain our infrastructure but also give us some flexibility in the way we plan for it. The simplest example is the spacing of manholes. While, historically, manholes were placed every 100 metres along a straight run for effective pipe maintenance, technology allows us to place them every 150 metres today — or eliminate them altogether with the use of radius bends. This reduction in standards

has a very positive impact on municipal budgets, yet it does not involve a reduction in level of service.

To clarify, Mr. Félio stated that this is not a reduction of standards — since our current standards represent minimum performance criteria — but bringing standards up to date.

Ken Whitwell used the example of road rights-of-way. Originally, these were designed to accommodate every possible road-widening eventuality (most of which never came to pass) and to allow the utilities to operate independent of one another. Because there is no direct public benefit in either of these situations, it is difficult to justify the extra space. Reducing standards in this case would not have a negative impact on level of service; it would simply mean a little less road-widening flexibility and a little more co-ordination between utilities.

Schoolyards are another good example. By reducing schoolyards from eight to seven acres, we effectively take away one acre of play space for children. The fact is, however, that children can play quite happily on two acres, and by giving them eight we do not increase their standard of play. Reducing the standards that relate to playground size — or eliminating the requirement for schoolyards altogether where public parks are adjacent — does not reduce a child's standard of enjoyment.

To follow up on Mr. Cumming's comments, Tom Field (CH2M Hill Engineering) added that we are still using the same manhole spacing requirements that we did over a century ago, despite the fact that we now have equipment that makes manholes redundant in many cleaning operations. The problem is, we are slow to take up innovation in the infrastructure business, and innovation allows us to maintain our level of service with less investment.

Mr. Field asked Ken Whitwell to explain how political and other barriers were overcome to accommodate the Hamilton-Wentworth/Philip Industries water/wastewater partnership agreement.

In response, Mr. Whitwell noted that in addition to the influential factors of in-house expertise, available private capital, and a mutual, long-standing friendship between the two principals, the partnership allowed the municipality to pursue its environmental leadership vision and achieve its economic goals. Allowing Philip — which would relocate its head office to the area, hire a local labour force, and carry out research within the municipality — to operate the water and wastewater systems at a reduced cost appeared to be the very best of all worlds: the municipality was providing infrastructure and jobs, getting investment in research, and gaining worldwide recognition as a centre for environmental excellence. At the same time, the labour force was guaranteed at least the same benefit package, as well as opportunities for profit sharing, teaching, and travelling abroad. There was no downside in terms of pensions, money, and security, and a definite upside with regard to job dynamics.

DAY 2
Afternoon Session

■ Information Dissemination ■

Moderator

Serge Pourreaux, Centre d'expertise et de recherche en infrastructures urbaines

Speaker

Christopher Gates, REIC Ltd.

Topic: *An Assessment of Municipal Infrastructure Information Needs*
(Background paper: *An Assessment of Municipal Infrastructure Information Needs*)

Whether we are talking about assessing the existing condition of our infrastructure, exploring alternative planning approaches, or considering innovative infrastructure financing options, there are many encouraging success stories out there. The problem is, no one seems to know about them. Somehow, our information dissemination system is letting us down. The fact that available information is not making its way into the hands of Canadian practitioners is a clear indication that we must find a better way to facilitate the transfer of information.

Before we can solve the problem, however, we must define it. One component of the information transfer problem is that information required by municipal practitioners is not always available or accessible. As well, there is a limit to the amount of time busy professionals can spend searching for information. These people tend to accumulate information — often in the form of magazines, trade journals, and technical publications — rather than seek it out. Then, when it comes time to actually find something, retrieval is almost impossible. And, of course, infrastructure covers a great deal of territory; the issues are even more diverse than the needs and the stakeholders involved. Practitioners are conservative, and rightly so. They resist change and take a cautious approach to innovation, particularly where no national or provincial standards or codes exist as a safety net.

It was against this backdrop that CMHC commissioned REIC Ltd. to conduct a study on information dissemination in Canada.

In the study, infrastructure was broadly defined to include linear types, water, sewer, roadways, treatment facilities, water supply, and wastewater treatment facilities, and a range of community facilities such as parks, arenas, libraries, and other municipally owned buildings. One technical and one non-technical staff person in 50 municipalities across the country were first contacted by phone and then sent an eight-page questionnaire. Of the 100 people contacted, 51 responded.

Of the respondents, 80% were technical personnel. The non-technical people surveyed — CEOs and commissioners of finance — assumed the questionnaire was too technical and delegated it to a technical subordinate. Thus, the results of the survey are skewed toward the technical side of the stakeholder group. Of the 39 municipalities that responded — a 78% capture rate — 10 had populations of less than 50,000, eight had between 50,000 and 100,000 people, and 21 had populations of at least 100,000.

The survey was designed to gather information on five key items:

- the types of information people are currently using;
- the sources they rely on to get their information;
- existing information gaps;
- the quality of information; and
- the accessibility of information.

In order, the types of information most frequently accessed relate to costing, operation and maintenance, technology options, planning and design, and demand management. (It is interesting to note that two years ago demand management would not have broken into the top 10 as an area of interest. Today, however, municipalities are taking a much more aggressive look at the advantages of demand management in running and maintaining infrastructure.) In order of demand, better information is required in the areas of technology options, costing issues, and operation and maintenance, and in terms of what is not currently available, the greatest identified gap is in the area of demand management.

With regard to where people get their information, a broad range of sources was identified, including journals, conferences, municipal colleagues (indeed, municipal action is influenced tremendously by what others are doing), consultants, codes, and standards. With regard to information quality, journals and conferences rate very highly, followed by other municipalities and trade magazines.

In terms of limited accessibility to information, the four top information sources were analyzed. Accessibility to information contained in journals was limited by the amount of time available to go digging: the higher the stack of magazines, the more time it takes to retrieve information. Accessibility to conferences and consultants was limited by cost, while access to information regarding other municipalities was hampered by not knowing where to go for information and who is doing what.

Although the types of information sought are similar in large and small municipalities, smaller municipalities were much less interested in information on demand management. As well, smaller municipalities appear to rely on consultants much less, and codes and standards, libraries, and computer networks much more than large municipalities.

According to our research, the future success of comprehensive municipal infrastructure information dissemination hinges on five key methods of delivery:

- codes and standards;
- education and training;

- publications;
- clearinghouses; and
- computer networks and data bases.

Canada has long been recognized as a world leader in the development of codes and standards as reference points for minimum performance levels. The federal government and other national and provincial agencies and organizations play an important role in the development of these standards (the National Building Code, for example) and are increasingly developing guidelines that go beyond minimum standards and into the realm of "best practice." Some examples of this are the guidelines for alternative development standards, stormwater management, and transit support produced by the Ontario government and national standards for R2000 construction, advanced houses, and healthy housing. By going beyond what is required, these standards help to synthesize and codify recent developments in technology and innovation and make them available to a wider audience. This is an important first step in changing the way we do things.

Codes and standards are accessible to users in any location, and because the information is synthesized in one, stand-alone document, the cost tends to be fairly low for the end user. They do have some disadvantages, however. Considerable upfront investment is required, as well as on-going development in the form of regular updating to incorporate changing technology and practice. Also, there is a considerable cost and effort involved in delivering the document to users and familiarizing them with it.

Education and training programs can be local or national in scope and can be offered by a research agency, professional association, university, or community college. They can be developed as required to address specific problems occurring in the field or used to support the wider application of best practice guidelines.

These programs offer a number of advantages. In many cases, practitioners can upgrade their credentials through professional accreditation. As well, information is transferred on a one-to-one basis, with opportunities to apply new information in an interactive setting. Cost can be a barrier, however. As well, the sponsoring agency must be careful in identifying its target audience and then designing the curriculum according to the learning needs of the participants. This requires an excellent liaison with the appropriate professional organization and entails a significant development cost.

Publications — journals, newsletters (formal and informal), and flyers — are the standard currency of information transfer for infrastructure professionals, and the number of publications in the field is staggering. For many practitioners, the amount of this kind of information is overwhelming. As an example, more than 20 titles currently available in North American deal specifically with water and wastewater issues! Although the purchase price is low, the time it takes to review publications must be factored as a cost. Most respondents had less than three hours each week to spend going through publications. Widely available and accessible to practitioners in any location, periodicals are only useful as a reference source if the information they contain is retrievable — in other words, if publications are catalogued and appropriately stored. Since this requires considerable investment in time and money, it rarely happens. A

number of publications are solving this retrieval problem by producing an annual index, either on hard copy or computer diskette.

Perhaps surprisingly, information clearinghouses rated very poorly in our survey, with only six to 10% of respondents making any use of them. Much like reference libraries, clearinghouses provide information, research, and retrieval services, which are often augmented by a publication distribution service, a newsletter service, or a toll-free hotline. Clearinghouses were among the first agencies or groups to put bibliographic information on computer disks and provide a hardcopy printout of information requested. Many are now providing online access to their data bases as well, with bulletin board services and computer conferencing for user interaction.

Although not onerous, the cost of joining a clearinghouse may be a barrier for some municipalities these days. The real barrier, however, might be the cost of online connection, since at the very least users will have to have access to a personal computer, a modem, and a printer. From the point of view of the sponsoring agency, the cost of setting up and running a clearinghouse is considerable (the annual budget of the national Small Flows Clearinghouse is close to $1.5 million).

Computer networks and data bases are today what the telephone was at the turn of the century, and, like the telephone, their popularity will continue to grow. With the advent of CD-ROM technology, practitioners can now buy an annual subscription to services such as Waternet, a program offered by the American Water Works Association. This option involves greater hardware costs (a CD-ROM drive to access information) but saves the user money in the long run due to reduced access charges and the elimination of downloading.

Like some clearinghouses, computer networks offer their users a bulletin board or computer conferencing service for direct interaction regardless of location. The linkage of various data bases and networks through Internet further enhances information and communication opportunities. A number of commercial services in Canada, including Compuserve, and some non-profit services (such as Web or Freenet) provide users with a ramp up to the Internet.

With computer networks and data bases, users can readily access information and, perhaps more importantly, carry on dialogue with their peers across the country and around the world. By keying in one or two words, practitioners will have access to information as specific as who is using a particular type of slip lining to rehabilitate sewers in soil permafrost-susceptible or highly acidic soils. However, a computer network system for information transfer is likely to be as challenging for institutions as the advent of the personal computers was in the workplace 10 or 15 years ago. Considerable lead time is required to develop the skills and gain the familiarity necessary to use this new medium, and will likely present a major, but not insurmountable, barrier to its widespread use.

A number of key questions must still be considered, and forums such as these are ideal for stimulating discussion and generating solutions:

- What should an information system for municipal infrastructure professionals look like?

- What can national organizations do to help ensure that the information required is reaching the designers of infrastructure, operators, and decision-makers?
- Could the time required to access journal articles be reduced through a printout or computer-based index of articles?
- Could computerized bulletin board and computer conference services act as a less costly way to keep in touch with colleagues?
- How could clearinghouses and computer networks be made more accessible?
- Could an intermediate step to a large national clearinghouse be used to set up computer bulletin boards relating to the annual conferences people are already attending?
- Should an infrastructure hotline be created?
- Is there a role for a new national digest in print to serve as an on-going index to articles and developments in Canadian infrastructure?
- How would the development of an infrastructure code for Canada improve the current situation?

Panelist

Daniel Friesen, Research Consultant, Federation of Canadian Municipalities
Topic: *The "Canadian Urban Research on the Environment" Project*

Canadian municipalities have an important role to play in preserving the natural environment and creating healthy and sustainable urban communities for Canadians and people around the world. To Canada's predominantly "urbanized" population, urban environmental degradation and its impact on quality of life, human health, and the natural environment are matters of substantial and on-going concern, especially since most municipal urban and environmental problems are related — directly or indirectly — to municipal infrastructure, urban land use, housing, and the built environment. Despite considerable achievements in urban management and the provision of infrastructure and services, a growing body of evidence shows that many urban activities and municipal practices are not sustainable and continue to harm the environment.

The Federation of Canadian Municipalities (FCM) developed the Canadian Urban Research on the Environment (CURE) data base information project to gather and disseminate information on Canadian municipal actions that improve the environment and promote long-term urban sustainability in Canada and abroad. The CURE project is investigating innovative environmental activities and sustainable development initiatives of a wide range of governments, large and small, in every province, territory, and region of Canada.

Canadian municipalities are diverse in terms of size, location, geography, spatial characteristics, and ecology, as well as socio-economic, political, cultural, and historical development. As a result, there has been an historical diversity in the experience of local governments in Canada and in their approaches to addressing environmental issues and concerns. This diversity of experience and approach has led to many innovative local-level solutions. While innovative solutions should be diffused between municipalities with certain attributes in common, they have little knowledge of what is happening elsewhere and where to turn for advice and direction. Where municipalities do undertake an information search, it is most often very informal, comprising a telephone call to a few colleagues in other municipalities. There is no systematic way to find out what other municipalities in similar situations are doing.

To address this gap, the CURE project was designed to survey Canadian municipalities about the actions they have taken to improve the urban environment. A series of three surveys were sent to 850 municipalities across Canada. The response rate of the larger municipalities was excellent (92% on one survey), while about 50% of the mid-size municipalities responded. The rate was much lower among the smallest municipalities — only 7 of 61 municipalities of up to 1,000 people responded to the third survey — which reflected not so much a lack of interest but a lack of relevance of survey questions (specifically those dealing with the "larger urban form").

From this information a data base was created comprising 18 different categories from air quality to water provision. The data base includes information on several infrastructure issues: energy management, housing and the environment, planning, solid waste, toxic material, transportation, wastewater, and water provision. The information is tabulated and divided into three sections

in a data base directory, including environmental contacts (more than 3,000) to facilitate information transfer between municipal colleagues and their counterparts in other jurisdictions and environmental initiatives (in excess of 1,200).

A printed directory containing all of the information gathered to date will be available in the near future, and electronic formats are being explored for CD-ROM and Internet applications. FCM is currently conducting a study to determine the level of Internet access and use by Canadian municipalities, and results to date are encouraging: access to online services is increasing dramatically. The other option is CD-ROM and diskette. All of these options offer a search and retrieval function, and convergence on the different electronic formats of information exchange — between CD-ROM and Internet, for example — will allow for a single reproduction of the document in hypertext format.

With this combination of information, FCM hopes to provide municipalities with support for collaborative efforts and an opportunity for information exchange and networking that will lead to the development of cost-effective solutions to the environmental infrastructure problems they face today.

Panelist

Michel Gauvin, Intergovernmental Committee on Urban and Regional Research
Topic: *A Municipal Infrastructure Resource Network*

The Intergovernmental Committee on Urban and Regional Research (ICURR) was established to facilitate information exchange between the various Canadian government departments that are actively involved in promoting orderly, planned urban growth and regional development through urban and regional research efforts. From its inception in 1967, the committee was assisted by a Toronto-based secretariat that ensures the implementation of committee decisions.

Involved in information services from the outset, ICURR's core is a library collection of about 12,000 documents that are available to members (primarily senior government planners, policy analysts, and local governments) across the country. Although the collection is small, it focuses on a broad number of research areas, including planning, local economic development, sustainable government, and local governments. ICURR librarians monitor research in all fields that can be linked with urban and regional research to ensure the acquisition, de-accessing, and integration of relevant new documents. The collection is catalogued on a bilingual computer data base, and members are informed of new acquisitions through bi-monthly newsletters or by requesting a computer printout of specific research topics. Members borrow documents of interest, with most loans processed the day they are received. Documents are sent by mail (return postage is paid by ICURR) or by courier if there is an urgent requirement for the information.

The service is not state-of-the-art, but it is organized with the practitioner, not the academic researcher, in mind. In the course of a year, ICURR staff do roughly 700 customized bibliographic information searches for members and loan out 20,000 documents, making the ICURR collection the best travelled in the country.

In 1992, ICURR decided to investigate the feasibility of developing an infrastructure focus. This decision was made for two reasons: ICURR's existing technology had to be replaced and the ICURR board of directors wanted to take a broader look at the type of service it was providing. The process was a two-step one, involving a user survey and the hiring of an external consultant to review the feasibility of developing a municipal infrastructure resource network.

The results of the user survey were not surprising given the planning/policy analyst bias of ICURR members: information related to urban, rural, and regional planning was considered the most important element of the collection. What was of interest, however, was the strong desire for improved access to information data bases, as well as maintenance of the document loan service. In essence, the survey told us that while ICURR members liked what they had, they would appreciate more; they were interested in online computer services but were not prepared to give up the old-fashioned library loan service.

At the same time, the Hickling Corporation was hired to determine the feasibility of developing a municipal infrastructure resource network. For the purposes of its study, municipal infrastructure was broadly defined as water distribution and treatment, sewage collection and treatment, road networks, municipal buildings, and recreational infrastructure such as arenas, pools, and park systems.

The first component of the study was a comprehensive assessment of existing municipal infrastructure information sources in Canada and the United States. Information was obtained from 20 Canadian and American organizations yielding three major findings: at least one or more organizations provided documents and/or information on each municipal infrastructure area covered by the study; U.S.-based services already offer clearinghouse services for some or all of the issues under consideration; and while Canadian sources offer only traditional staff-assisted search and library loan document services, U.S. sources often offer an online index search service or full on-screen document browsing.

The second component of the Hickling study comprised an assessment of the needs and potential demand for municipal infrastructure information and the gaps between information availability and demand. A stratified mail survey involved 214 organizations, with telephone follow-up of 29 respondents. The results:

- there are about 750 potential users of such a service;
- gaps in information are a factor of limited availability, continued reliance on such traditional sources such as journals and personal contacts, and accessibility;
- there is a high demand for online browsing and index search services (which are not currently available); and
- there is a need for information on all infrastructure types, but a corresponding unwillingness to pay for information services (Canadian municipalities and government organizations are unaccustomed to using commercial sources, computer data bases, and data brokers to obtain this type of information).

The concept that Hickling proposed was a municipal infrastructure information clearinghouse network. It would be designed as a partnership model, involving Canadian municipalities and other organizations that have an infrastructure focus. An electronic information collection with data base access would be developed to parallel ICURR's established hard copy service. With a 911-style infrastructure set-up — where members call a main number that connects them to a central computer — ICURR would be more like a gateway to information rather than the ultimate information destination. Some of the information would be ICURR-generated, but the service would also connect users to other online organizations.

The stumbling block was a financial one. With a minimum up-front investment of $700,000 and an annual operating cost of about $300,000, the proposal was unaffordable. Despite this, however, ICURR has made investments in new technology. A new mini-computer (with substantially more power than is currently required), optical scanners, and optical character recognition software will allow for the development of a full fixed data base of best practices as they relate to the various themes currently included in the library's collection. As well, a consultant has been hired to enhance the ICURR library data base software to make it more user-

friendly for a future online access system. With regard to online access, two options are currently under investigation: a partnership with an existing not-for-profit organization that offers relatively low-cost bilingual information services, and contracting out with a private sector online provider.

These investments will enable ICURR to become a partner in any infrastructure information service that is developed. Until such time, however, ICURR's existing service — the library, computerized catalogue, and the commitment to process loan requests expeditiously — is a low-tech solution that works.

Panelist

Roger Mareschal, City of Aylmer Municipal Councillor and Member of Commission d'urbanisme de la Communauté Urbaine de l'Outaouais

Topic: *Successful Communication in Infrastructure*

The difficulty of getting city councils, councillors, and elected officials to understand infrastructure-related issues and to accept the changes proposed in such alternative development models as new urbanism is a common problem. But, ultimately, it is city councillors that vote — and it is their vote that counts. How, then, can we tailor our methods of communication to steer our elected officials in the direction that we, as specialists in municipal infrastructure, think they should go?

As a politician, I have deliberately understood information dissemination to mean "communication." We tend to communicate "with" while we talk "to" or "at," and simply inform (which is perhaps why we do not get the anticipated result when we inform). In many cases, our attempts at "communication" exhibit one or more of three common characteristics: they are one-way streets, they assume the listener is only interested in what we are saying, and they are based on the precept that what we say and do are the sole determinants of listener reaction.

Communication as a one-way street is not really communication at all but information dissemination. It is an "us to them" process with no opportunity for return flow or feedback. Because we view ourselves as "qualified experts," we feel that the simple act of our speaking should convince audiences not only to accept what has been said but also to rush out and disseminate the good news. Experience has shown, however, that this is not the case. The one-way street leads to information overflow, not communication.

In our attempts at communication, we often operate as if we are the only thing happening to the listener at the moment we speak. This is simply not true. As communicators, we are in direct competition with a number of deeply entrenched listener preoccupations that are much higher on the listener's list of priorities. Often, the person for whom our communication is intended appears to be listening but is, in fact, a million miles away.

Similarly misguided is communication that assumes that what a speaker says and does is the sole determinant of a listener's reaction. This results in a preoccupation with speaking in a way that will not upset the listener. As a consequence, we become so focused on what to say that we ignore the more crucial problem of how to get the target audience to listen.

Clearly, these three methods of "communication" are far from effective. The best way for communicators to make themselves heard is to find a way to match the speaker's needs with the listener's needs. True communication is based on the satisfaction of mutual needs; a relationship between minds. Communication is only achieved when each party satisfies the needs of the other. To be effective, therefore, communicators must be able to identify with the needs of their audience; to relax their focus on what is right and concentrate on how to make what they are selling match what the audience wants to buy. Success is the result of value multiplied by acceptance, which means that a perfect solution is a zero without acceptance. Rather than shoot

for a perfect 10 in quality, therefore, communicators might be better advised to go for 25 — a five in quality and a five in acceptance.

As purveyors of change, what we must do is establish a relationship with our audience and use communication to stimulate a pooling of information; a shared interest; a coming together of views. But what leverage can we use to make this happen? Communication is simply a sophisticated marketing tool. As specialists in our field, the process we use to make our message compatible with the unfulfilled needs of our audience can be compared to a manufacturing company that determines a need, creates a product to fill it, packages the new product attractively, develops a network to distribute it, and then sets out to find a group of purchasers.

The level of buy-in separates those who are right from those who are successful. In strategic terms, it is important to recognize a business communication as a discrete event in a continuous process or a sequence of discrete events. This kind of communication is driven less by facts than by fit; by the complex interplay between communicator and audience. If the fit is good, the audience will not only hear the speaker but also be willing to share ideas and engage in open, productive dialogue. This is communication, and to achieve it, five key elements are required: communicators must recognize the needs of the audience and demonstrate this recognition; communication objectives must target the satisfaction of unfilled needs and provide workable solutions to real requirements; the communicator's message must provide a rationale for action and motivate behaviours, rather than simply justify them; the message must provoke unequivocal clarity in the mind of the audience; and the message must be sincere and credible (this will engender the trust of the audience).

Because we are communicating to an audience (often elected officials) that must in turn communicate our ideas to others, our ultimate goal must be to empower. We must instil confidence in our audience, so that it will feel capable of effectively selling, or at least defending, the cause we want them to further. Of course, this compounds the communication problem and requires communicators to have a good understanding of the environment in which their audience operates and the constraints it might face. Communicators must also have a very clear, organized, thorough, and intimate knowledge of the product or concept they are selling. This must be based on the systematic analysis of every parameter and possible linkage the audience will want explained, both to aid in its own understanding and its ability to sell the concept or product to others. References to actual implementations can help to remove the barrier between concept and reality, and the creation of a direct link between the politician and the proponents of a successful working example is the best way to win support.

Any data presented in support of a concept should be provided in chart form. As well, uncomplicated drawings or illustrations facilitate retention of key elements. With a clear picture in its mind, the audience will feel more confident about expressing the concept to others. Analysis of concept characteristics must be provided with the identification of one or two outstanding attributes that fill a particular audience need. These elements of "central appeal," as they are called in the world of sales, are the trigger arguments on which the rest of the case is built. The presentation must be simple and focused and provide the audience with the kind of information it will want to use in its own sales pitch.

Although it might seem a fair assumption that, given today's environment of financial constraint, citizens will jump on anything that spells savings, the opposite is true. Economic hardship results in more demanding attitudes regarding the fundamental attributes of quality of life — peace and quiet, person space, and intimacy. Thus, density is not a particularly easy concept to sell to the public, unless it translates into real savings and no hardships. The best approach might be to target specific areas and then try small-scale pilot projects that will demonstrate the benefits of these developments, not the demise of existing neighbourhoods.

And, since elected officials represent a cross-section of the population — not a body of practitioners with technical or managerial backgrounds — it is important that a communication strategy is not riddled with technical jargon or confusing dialogue. If certain knowledge prerequisites precede concept assimilation, this should be factored into the plan. We know that unsatisfied customers will spread the word far more effectively than satisfied ones and that advocates can become enemies. Thus, it is important that the audience does not at any time feel cheated out of information or that what they have been told is not true.

A number of communication techniques are associated with a high level of success. Why not:

- use federal/provincial/municipal organizations (such as Canada Mortgage and Housing Corporation, Federation of Canadian Municipalities, and the Canadian Association of Municipal Administrators at the national level and, provincially, Association of Municipalities in Ontario and l'Union des municipalités du Québec in Quebec) for leverage? Their credibility is already established, and they will enhance yours;
- propose to organize workshops or seminars during annual conventions of provincial associations;
- organize regional seminars with technicians and politicians in attendance together (this allows for the development of a common language and training base);
- design and disseminate fact cards rather than long brochures (one or two at a time to avoid information overload) because communication is not about throwing out paper;
- use television and print media to educate the public (local television and cable channels offer free coverage and a targeted audience; local weekly newspapers will print almost anything and love reports and case studies);
- educate rather than convince (avoid hard-sell tactics; educate, provide information, sensitize the public, and always be available to answer questions);
- use schematics in the presentation of economic and financial data;
- use modelling;
- use Internet and BBSs for online browsing for research purposes; or
- create dissatisfaction with the status quo rather than sell change.

And remember, whether we like it or not, perception is reality. For many people, "new urbanism = density," and density is cheap, poor, and socially undesirable. As Confucius said, "If you are right and everybody thinks you are wrong, you are wrong."

A serious research effort should be directed at the expectations intrinsic to the communication equation. Only then can we address political and public preoccupations, knowledge gaps, sensitivities, and priorities. Once we know who we are communicating with, then we will understand what it is we need to communicate and will be able to get prepared.

Roundtable Discussion

Guy Félio, of the National Research Council Canada, agreed with Christopher Gates that federal codes and standards and best practice guidelines offer a number of advantages, including uniformization of the infrastructure market. He disagreed, however, with some of the disadvantages mentioned by Mr. Gates — specifically the investment requirement. When considering investment in such documents, it is important to consider the benefit/cost ratio and, with regard to urban technical infrastructure, the use of the best available technologies can have a significant impact on municipal spending. The savings generated more than offset the cost of developing best practice guidelines. Indeed, estimates indicate that $5 spent on the development of a National Infrastructure Code would result in annual savings of more than $1,000.

With favourable result (about 33%), Colin Leech, of OC Transpo, asked for a raise of hands to show how many participants already have access to the Internet, a fabulous resource for communicating with peers and people across the country and around the world.

Dan Friesen provided clarification about an FCM initiative called Public Technology Canada (PTC). The new corporation is a joint effort between CAMA and FCM, and is an FCM initiative designed to offer municipalities a marketing mechanism for distributing and selling public technology. Because municipalities often are not permitted to or simply do not sell the technologies they have developed, these are either given away or simply sit on the shelf without ever recovering their development costs or realizing any profit that might be possible through an effective marketing program.

PTC, said Mr. Friesen, will look at a number of different issues, including the Canadian Municipal Energy Efficiency Facility, an energy retrofitting program for municipal buildings modelled on the Federal Building Initiatives program, and the development of an information highway that would bring services to municipalities though the Internet. Associated with U.S.-based Public Technology Inc. (PTI), PTC is learning from the U.S. experience.

Tom Field, of CH2M Hill Engineering Ltd., remarked that the communication or public consultation aspect of infrastructure planning for liquid and solid waste management — a process that appears to be politically imposed — is becoming increasingly expensive. He wondered whether these processes are a substitute for leadership on the part of the politicians.

In response, Roger Mareschal noted that where a formal consultation process is imposed, it is well worth the cost (often several thousand dollars for a three-hour meeting) to hire a facilitator. He advised planners never to attempt a public meeting if they do not know how to work with the crowd: that is the job of a facilitator. Mr. Mareschal recommended, however, that where possible the formal consultation process should be replaced with an open house or drop-in meeting. Have 10 "experts" sit at different tables around the room to answer individual questions. This kind of set-up tends to diffuse hostility and create a co-operative, rather than adversarial, atmosphere. And people actually get more information by chatting informally than listening to formal presentations. People tend to be on the defensive at public meetings: they are

in "attack mode" and are not in the mood to ask questions. The whole thing often snowballs, with each person trying to outdo the last and getting nowhere. It is not consultation; it is a boxing match.

Robert Noseworthy, of the Newfoundland and Labrador Housing Corporation, asked Guy Félio if NRC had made any plans regarding the proposed national infrastructure code. He wondered if NRC would be developing a technology transfer or information dissemination program to bring the code to the user?

Although he could not answer this question with complete certainty, Guy Félio (NRC) made reference to Worldwide Web and Internet applications for effective information dissemination. He encouraged comments on the discussion paper and referred to its development as part of a "consultation process." Mr. Felio also noted that, some time ago, CMHC and NRC conducted an informal consultation process to solicit input from various levels of government regarding the concept of a national infrastructure code.

As a concept, the national infrastructure code has been under consideration since 1992. But its fate has yet to be decided. The first step is to receive and analyze any comments on the discussion paper. After this, financing options for developing a national infrastructure code will have to be examined. If the decision is made to proceed, NRC will facilitate its development by key stakeholders.

Serge Pourreaux commented that codes and standards represent two different levels of intervention. Codes, such as a national infrastructure code, relate to management philosophy while standards are a technical measure.

In response to a question from Mr. Félio, Mr. Pourreaux noted that performance specifications or contracts based on performance standards could be considered in discussions regarding private/public partnerships. These contracts differ with the ones based on specifications and the lowest bidder principle. To produce a market based on performance standards, parameters in the bid must be standardized. And, to be standardized, all parties must agree on the proposed performance criteria. Thus, the interest in standardization is the result of the evolution of the specifications market, which is designed to encourage the use of new technologies.

Studies focusing on technology transfer have highlighted the difficulties confronting municipalities in accepting new work methods for infrastructure. In the call for bids, it was impossible to include solutions that differed from the conservative and familiar ones. Thus, if we want firms to involve new technologies, materials, and methods in their bids, we must change the way we award contracts. To do this, we must have a reference system of standards that will allow us to assess and even certify products, technologies, and methods.

Within the national infrastructure code, however, a top-to-bottom approach or management philosophy is used. Few standards address the rehabilitation issue. Standards are designed, developed, and taught in engineering faculties across Canada for construction purposes. We build systems, we build roads, we build bridges, but there is no one to teach us how to

rehabilitate this infrastructure. And even fewer people have worked on the standardization of rehabilitation techniques.

Mr. Pourreaux remarked on the multidisciplinary nature of today's information. A technical issue — "no dig techniques," for example — is now argued not only in the technical realm but also in the social and fiscal arenas. Every piece of information includes a political, management, and technical component. He suggested that the survey results would have been different if the three different stakeholders — politicians, managers, and technicians — had been reached.

■ Wrap-up ■

Speaker

Pierre A. Letartre, School of Administrative Science, Université Laval

In preparing these notes, I was guided by two questions:

- What key issues were the participants to debate?
- What did we learn from the answers provided by the speakers, panelists, and participants?

This workshop is a follow-up to a workshop entitled "Infrastructure and Housing: Challenges and Opportunities," held in June 1992 at the University of Western Ontario. The 1992 workshop examined a number of issues relating to municipal infrastructure: the optimum level of investment in infrastructure planning and maintenance; and the impact of infrastructure financing on housing choices.

The objectives of this year's workshop were: to gain more knowledge on the economic, social, and environmental aspects of municipal infrastructure planning, management, and financing; and to find ways to improve the dissemination of information in this area.

Four major themes were addressed:

- assessment of municipal infrastructure conditions;
- cost savings through alternative planning approaches;
- financing of municipal infrastructure; and
- dissemination of information on municipal infrastructure.

These four themes are important because urban infrastructure is a key determinant in the productivity of cities and urban areas.

Under current economic agreements that promote the elimination of trade barriers between countries, the most intense economic competition will not be between nations but between urban areas within the large economic blocks. In fact, in each of these large blocks that are America, Asia, and Europe, competition will be fierce among urban areas as potential locations for private investments that lead to job creation and wealth.

Urban infrastructure is a natural component of the logistical support required for these private-sector production activities. The capacity of businesses to invade markets, and remain in them, depends directly on the quality of the logistical support that can be provided by the urban areas where these businesses establish themselves.

As such, a drinking water and sewer infrastructure system in good condition ensures adequate sanitation and a basic quality of life for workers, just as an efficient transportation system for people and goods allows both firms and households to be more efficient.

In short, without adequate infrastructure, the economic production sector of a given urban area, and also its consumer sector, would have to assume even greater costs. This would likely compromise its comparative advantages in competing with other urban areas.

Assessment of the Condition of Municipal Infrastructure

The purpose of the survey conducted by Guy Félio, from the National Research Council, was to identify the measurements used by Canadian municipalities to assess the state of their infrastructure systems. About 50 cities of varying sizes received two questionnaires, one concerning water distribution systems (45 responses received the end of February 1995) and the other on stormwater and sewage collection systems (41 responses).

The results of this survey warrant some caution with respect to any statement on the true state of our water and sewage systems. In general, measurements used by Canadian municipalities to determine the state of their infrastructure systems are incomplete and often subjective. More specifically:

- there are no standards for a sufficiently objective determination of the state of water and sewage systems that could result in a strict classification;
- concerning water distribution systems, measurements used to establish infrastructure conditions vary a great deal from one city to another, although certain measurements are in general use: number of breakages, number of complaints, insufficient pressure in the case of fires, maintenance files, and personal experience; and,
- regarding stormwater and sanitary sewage collection systems, most cities use closed circuit television inspection reports, number of complaints, age of systems, maintenance files, and the personal experiences of managers.

The majority of municipalities that were surveyed regularly check their systems by means of external visual inspections. They also use cut-out sections to check their water systems and closed circuit television to keep an eye on their sewage systems. Infrastructure management systems are used (essentially to co-ordinate capital projects, maintenance, and replacement work) mainly by large cities that have the resources to do so. Still, as the author of the survey pointed out, local infrastructure assessment by municipal officials remains largely subjective.

If there is one point on which a reservation has to be issued in respect of the results analysis for this survey on infrastructure conditions, it is the use of client complaints as an element in the measurement of the state of a particular system. While the number of client complaints may be subjective, it remains an important variable, in my opinion. In fact, the residents of an area are the ones who should decide on the quality of the systems that they are willing to pay for themselves, in accordance with their preferences. Every area can choose to increase or reduce the resources allocated to any given system, based on its development goals and the needs of its residential and non-residential taxpayers. For the same level of infrastructure, the number of complaints can therefore vary from one area to another, depending on regional choices and differences.

This position is not incompatible with the development of a municipal and regional infrastructure performance code by the National Research Council. The existence of a national code can allow for a flexible application in every area, in accordance with local choices and municipal and regional priorities.

And, among these priorities, we must thank Guy Félio for making us aware of a critical impending situation where a good portion of the local knowledge on the state of the infrastructure in a number of Canadian municipalities lies in the memory of a few municipal professionals who will soon be retiring. Those cities affected must therefore give priority to the transfer of this living knowledge to specialized systems using such methods as those offered by new information technologies and electronic storage.

Among the panelists of this first session, Serge Pourreaux, from the Centre d'expertise et de recherche en infrastructures urbaines (Centre for Expertise and Research on Infrastructure in Urban Areas), made relevant points, particularly about it being to Canada's advantage to make it possible to transfer more advanced technology from European countries like Germany. Greater use of investment analysis techniques based on life-cycle costing would also be beneficial. As well, contracts for performance specifications, which the City of Montreal would like to render operational in the near future, constitute an effort to draw on the private sector for technological innovations that it can obviously provide.

Another panelist, Bob Funke, from the Town of New Glasgow, informed us that smaller municipalities depend extensively on expertise from outside of the municipal public service. A major reason for this is that it is often difficult for local professionals to manage "ready-to-use" projects that have been handed over to municipalities by outside consultants. These consultants must be called upon every time a major difficulty is encountered. To resolve this problem, several municipalities from the same urban area can get together to develop a local management capacity and internal expertise in the area of municipal infrastructure.

Tom Field, from CH2M Hill Engineering, pointed out that the rigour and discipline of the private sector were always there to remind us of our duties; in this respect, he noted how difficult it was to purchase flood insurance in certain areas where infrastructure is defective. As for the future of municipal infrastructure consulting activities, he predicted the following major trends:

- more "ready-to-use" design/build projects by the private sector;
- more system-operating contracts by the private sector;
- fewer traditional consultant engineering contracts; and
- more innovations in the area of infrastructure maintenance and replacement.

The final speaker in the first session was Sebastian Moffatt, who raised the issue of the validity of current accounting methods for estimating housing costs. According to this panelist, these methods must be reviewed so that the choices made by housing consumers reflect actual costs. However, the view was expressed that at least three obstacles hinder the widespread acceptance of the life-cycle accounting method: difficulty in accessing data; complexity of the products being evaluated; and integration of sustainable development concepts into the calculations.

In spite of these difficulties, the public sector can rely on techniques developed by the private sector to calculate housing costs. Activity-based costing and other techniques used by the private sector can be transferred to the public realm. Geographical and socioeconomic limits must also be defined, however, in order to make this type of accounting possible.

Cost Savings Through Alternative Planning Approaches

Can our cities be developed to eliminate urban sprawl and the resulting waste of resources? This was the underlying question of the second workshop session. The first speaker, Ken Ferguson, from Hygeia Consulting Services, presented several innovative urban development projects, including those that feature "new urbanism," neo-traditional, eco village, and sustainable development planning principles.

Mr. Ferguson humorously noted that the first such innovative project is 20 years old: "the more things change, the more they stay the same." He acknowledged that recent higher-density urban development projects are often new forms of old ideas.

Four Canadian case studies were presented: Cornell (Markham, Ontario), where the project is at the secondary plan approval stage; McKenzie Towne (Calgary, Alberta), a new city on a site within the limits of Calgary, at the approval stage; Montgomery Village (Orangeville, Ontario), a 750-unit project currently under construction; and Heart of Springdale (Brampton, Ontario), a project that has been cancelled for the moment.

New urbanism is new, especially when the development in question integrates a series of elements that give priority to pedestrians over motorists. Several participants pointed out, however, that some of these elements or innovations have been used perhaps more progressively but less spectacularly in a number of current developer projects.

Hygeia Consulting developed an evaluation framework to analyze the strengths and weaknesses of new urbanism in the projects that were studied. In terms of cost, it appears that new urbanism does not have any decisive advantages over traditional planning with regard to comparable densities. It is important to note that maximum urban infrastructure profitability is not the principal objective of new urbanism, which is mainly concerned with generating a higher quality of life.

The work presented by Ray Essiambre, from Essiambre Phillips Desjardins, focused on a comparative study of a traditional suburban project and a project where new urbanism or neo-traditional principles had been applied. The comparison was made using site plans for each project, considering the life-cycle cost of infrastructure, and distinguishing public costs from private costs. With a life cycle of 75 years, the study was exhaustive, and took into account not only the initial investment cost and operating and maintenance costs but also the replacement cost of infrastructure components based on their useful life.

Among the more significant findings of the study, I noted the following:

- The total life-cycle cost of the neo-traditional project was higher than that resulting from traditional planning; however, the per unit and per capita costs were lower for the new urbanism project because of its higher density.
- Over 65% of the life-cycle cost of infrastructure was attributable to operating and maintenance costs, which is further justification for applying user fees to municipal services.
- Schools and school transportation facilities were the most costly services under infrastructure expenses, accounting for one-third of the investment cost, over 55% of the operating costs, and about half of the life-cycle cost for the 75-year period.

Before development projects are authorized, it is easy to see how distorted tax profitability calculations performed by municipalities can be when school equipment costs are not charged to municipalities. If municipalities had to finance their school equipment in the same manner as their municipal infrastructure systems, they might be more demanding in seeking higher densities in their jurisdictions.

Evidently, the lower costs of a new urbanism project are mainly due to the higher density. In the comparison, a 71% increase in density (from 4,005 units in the traditional project to 6,857 units in the new urbanism project) resulted in a 7.5% decrease in the life-cycle costs per unit. As these savings are quite small compared to the 71% increase in density, the real question is whether consumers will accept such an increase in density in exchange for other "quality of life" elements afforded by the new urbanism approach.

While a number of urban intensification projects are aimed primarily at minimizing the cost curve, some traditional "designer" projects, which value low-density elements reminiscent of rural settings, seek to maximize the benefit curve. Both approaches present problems, however, because homebuyers always want to maximize net benefits — the difference between a project's benefits and costs. Rarely is the level of intensification that maximizes net benefits either at the bottom of the cost curve or at the top of the benefit curve.

Therefore, the difficulty lies in estimating the optimum point at which the net benefits of housing consumers are maximized. This is why market surveys are so useful — and necessary. As panelist Ron Desjardins, from Brethour Research Associates, pointed out, market surveys establish not only the potential clients of these new urbanism projects but also the trade-offs and substitutions that exist between the costs and benefits of these projects.

As one participant bluntly noted: what is urban quality of life and who defines it? Is there any danger of social re-engineering in the name of new planning? If municipalities within our urban areas, especially the suburbs, are competing against each other, how come these new planning projects do not crop up by themselves on the basis of their own merits?

Financing of Municipal Infrastructure

The second day of the workshop focused on the issue of public/private partnerships in the area of municipal infrastructure financing. What forms do these partnership arrangements take, and what are their implications for housing? Kenneth Whitwell, of the IBI Group, presented a number of partnership models that exist. Of the 18 case studies outlined in his background paper, he talked about those relevant to infrastructure and housing: common facilities in Cumberland; schools in Metro Toronto, the Township of Pittsburgh, Nova Scotia, and the Regional Municipality of Peel; recreation facilities in Richmond, British Columbia; the Route 14 aqueduct in Alberta; the public library in Scarborough; regional roads in Waterloo; wastewater treatment facilities in Rockland and Ottawa-Carleton; the water purification plant in Sainte-Marie-de-Beauce; and the water and wastewater treatment facility in Hamilton-Wentworth.

As the speaker's definition of partnership was quite broad, for some participants, several examples did not correspond to their concept of partnerships between the public and private sectors where profits, losses, and risks are shared. Several experiences involving partnerships in management were also not addressed.

However, two conclusions can be drawn from the case studies submitted:

- The private sector often contributes managerial expertise and motivation for results, elements that are often lacking in the public sector for various reasons.
- Although new arrangements between the public and private sectors often lead to financial transfers from all taxpayers to a particular group of taxpayers — new residents or direct consumers of a service, for example — such transfers are valid because resource allocation is more efficient and a link is established between those who benefit from and those who pay for a service.

Panelist Kennedy Self, of the City of Scarborough, acknowledged that many urban redevelopment projects involve such partnerships and then described several partnership arrangements that had taken place in downtown Scarborough.

Robert Cumming, of the River Oaks Group, insisted on the necessity of using life-cycle costing and on the good use that could be made of a potential study on the actual short- and long-term costs of urban infrastructure.

Panelist Enid Slack ended the presentations by asking three fundamental questions on partnerships and infrastructure financing: are partnerships more competitive?; who benefits from and who pays for infrastructure?; and who, between the private and public sectors, should borrow to finance infrastructure?

The first question assumes that competition leads to increased efficiency in the production and operation of infrastructure systems. Although it is generally the case that efficiency generates greater savings and more choices, the problem is that privatization does not necessarily lead to greater competition — and its resulting advantages. This is especially true with regard to smaller

towns, where there is rarely enough competition within the private sector for there to be any benefit to transferring activities from the public to the private sector.

Competition can be created between public-sector organizations, however. Inter-municipal competition does exist, and it is possible to enhance competition between public-sector organizations in order to reap the benefits of competition without privatization.

The second question on infrastructure costs and benefits naturally raises the issue of the importance of taxation based on benefits received; there must be a link between the consumption of a service and the price of the service to the user. In short, user fees for municipal services constitute the operational mechanism that can ensure this link between those who benefit from and those who pay for a service.

With regard to the third question on the financing of loans, Ms. Slack observed that municipalities generally do not like to borrow (especially in Ontario) to finance their infrastructure systems, but that they should because their borrowing costs are lower than those of the private sector (developers or new residents). I have a reservation about this last point. While it may be true that interest rates are generally lower for the public sector than for the private sector, the ultimate accountability of those who require and benefit from the development must still remain a fundamental objective. Just as administrative expenses must necessarily be accepted to charge a service price to every user in the case of a user-pay approach for municipal services, the same logic should apply to the financing of infrastructure systems. Borrowing costs are indeed higher for the private sector, but this is the price that must be paid to achieve user accountability and better control of the demand.

Dissemination of Information on Infrastructure

What are the existing and new ways of disseminating information on municipal infrastructure? In response to this theme question for the fourth part of the workshop, speaker Chris Gates, from REIC Limited, presented the results of a survey aimed at assessing the information requirements of municipal employees in charge of infrastructure planning, production, and operation. The survey questionnaire was sent to 100 employees in 50 municipalities and the response rate was a remarkable 78%, and nearly 80% of respondents were technical staff from the municipalities. Overall, the results demonstrated the importance of disseminating information on infrastructure and housing.

In a market economy, the government's fundamental role is to make sure the market runs efficiently and that information is therefore easily accessible and available. Consequently, I believe it is important that government facilitate access to information and research on infrastructure and housing, especially through computer networks. The information should be available on CD-ROM and through the information highway (Internet and World Wide Web, for example).

In this context, it was fascinating to learn from Daniel Friesen that his organization, the Federation of Canadian Municipalities, is currently involved in the implementation of a Canadian Urban Research on the Environment (CURE) data base. The Intergovernmental Committee on Urban and Regional Research (ICURR) is also interested in being a partner in any network development. Michel Gauvin, from ICURR, discussed the role of his organization in establishing the Municipal Infrastructure Information Clearinghouse Network.

The comments of the final panelist, Roger Mareschal, a municipal councillor and member of the Commission d'urbanisme de la Communauté urbaine de l'Outaouais (Outaouais Urban Community Planning Commission), concerning communications with local elected officials were extremely relevant. Marshall McLuhan said that the medium is the message. Mr. Mareschal reminded us that we must go beyond informing to communicating. Many problems arise from a lack of communication between the technical and political communities, and the dangers inherent in informing people is that this is one-way communication. Mr. Mareschal explained how to establish effective communications between the technical and political communities.

In conclusion, I would like to present three points for consideration:

- Infrastructure systems are often economic goods of a private nature

Municipal infrastructure systems — water and sewage systems, water treatment plants, recycling facilities, and so on — are essentially economic goods of a private nature. Their consumption is most often individual since it is possible (albeit socially difficult) to exclude those who would not want to pay, and the costs and benefits are measurable. Therefore, it is possible to authorize user fees and to recover expenses.

On the other hand, infrastructure systems are private goods offering major economies of scale, and this could prevent competition and lead to a monopoly. It is often for this reason that these goods are acquired by the public sector, which ensures both their production and operation. Similar monopolies do exist, however, in the area of communications (local telephone, for example), where the government does not own the infrastructure but monitors the prices charged to consumers (CRTC).

In short, although infrastructure systems are now generally owned by the public sector, their characteristics are such that these systems are goods of a rather private nature in terms of economic analysis. This means that, in theory, there are no obstacles to the privatization of existing or future infrastructure systems, provided that consumer prices can be regulated to prevent monopoly profits. This reflection may give rise to some interesting prospects in these times of excessive indebtedness in the public sector.

- User fees and their problems

The application of user fees is a recurring theme in municipal tax specialist recommendations. Why then is this approach used so little in municipal financing, and why is it so difficult to put user fees into practice?

The problem results from an informal consensus among the converging interests of municipal service consumers, producers, and policy-makers.

Municipal service consumers naturally prefer free services, but they know very well that nothing is free. Given that there is an uneven distribution of wealth in many large municipalities, they acknowledge, however, that it is to their advantage if a service is financed through a rather progressive tax. Indeed, for many services (but not all), the absence of user fees results in a redistribution of the wealth that is favourable to a larger number of taxpayers.

Service producers also consider that free services are in their best interests as they believe user fees could reduce consumption of the services they provide — which in turn may directly affect the importance of their work within the organization.

For policy-makers, a free service or one that does not involve direct user fees offers advantages in terms of votes. The implementation of user fees for a service perceived as free by a majority of taxpayers certainly will require political courage.

Consequently, public servants and policy-makers share some common interests that do not favour the implementation of user fees for municipal services. Only an event beyond anyone's control — federal tax transfers, for example — could weaken this natural coalition.

- Planning and the price system

Low-density development and the resulting urban sprawl will continue as long as low-density suburban housing represents a bargain for consumers.

However, this low-density development results from a distorted pricing system. Residents in new suburban developments do not directly pay for what amounts to major costs on society imposed by their development choice. It is not good enough to implement user fees to replace some of the public costs for infrastructure and municipal services if the fee structure is based on average cost. It does not reflect the marginal cost fairly.

Consumers are rational; they opt for low-density development because it is subsidized and offers more for less. Consequently, in order to counter this type of development, consumer choices must be made based on actual development costs.

Every effort should be made to bring in a costing system based on true prices and user fees for municipal and school infrastructure and for municipal and regional services. An accurate pricing system is the only way to encourage sustainable development.

■ Closing Remarks ■

Speaker

Douglas A. Stewart, Canada Mortgage and Housing Corporation

This workshop has given us much to think about. Without trying to replicate the synthesis that Pierre Letartre has provided, I would like to make a few observations regarding the role of infrastructure information, especially as it relates to the management and the condition of our infrastructure, who benefits and who pays, what consumers want from their own communities, and public/private partnerships.

The information we have on the state of our infrastructure and existing technologies to improve our systems can, and should, be put to better use. For example, Guy Félio made a comment that Canada could realize a savings of $1 billion if municipalities used current state-of-the-art infrastructure management systems. This is a powerful statement.

How do we get municipalities to adapt these systems? The key lies in disseminating the information that is available on these systems to municipalities. We need to ensure that municipalities are aware of them. Perhaps the key lies in establishing an infrastructure information network to ensure all municipalities in Canada have access to information on best practices.

It is also important to "communicate" properly, as Roger Mareschal suggested, to ensure that both the municipal decision-makers and the general public are convinced of the utility of these management systems.

Enid Slack gave us a very good primer on municipal finance, and the question of who benefits and who pays is central to the infrastructure question. Sebastian Moffatt is absolutely correct when he says that many of the `hidden' costs relating to consumption patterns must be made more explicit. Only then will we know what the real trade-offs are. Otherwise, we will continue to make the implicit trade-offs in ignorance.

Although I accept the general principles behind full-cost accounting, I am concerned about our ability to operationalize the concept. For one thing, the conclusions one will reach about the societal cost of an activity — take the suburban house as an example — will depend on where one draws the boundaries of one's investigation. A line drawn around new suburban housing will lead one to a different conclusion than if a line were drawn around every housing type — and the conclusion would be different again if commercial and industrial activities were included in the analysis. In exercises of this sort, in theory at least, the more comprehensive the analysis, the better. On the other hand, the more comprehensive the analysis, the more difficult it becomes.

Another important component to this type of analysis is the distributional issues surrounding pricing. Not only will the starting points differ significantly for different groups of people, but it is also important to remind ourselves that the distribution of income and wealth is not equal.

With respect to the issue of what consumers want in new communities, many issues were raised in the discussions of the new planning approaches. However, there appears to be a continuing problem of how to determine what consumers really want. It is disturbing to note that the current system seems to be dooming us to producing what established residents want rather than what people who will live in the new community want. This, of course, is not a new problem for planners or municipal politicians, but it seems particularly relevant in light of Enid Slack's comment that these consumers will likely have to pay not only for the communities in which they will live, but for the communities of past and future generations as well.

The discussion about public/private partnerships was fascinating for its topicality as well as its ability to lead us into a discussion of the very fundamentals of public finance. I was glad that the differentiation was made between partnerships that provide some intrinsic benefit and those that are simple expedients for breaking development process log-jams. As Robert Cumming advised, we should not consider public/private partnerships as **the** solution in every situation or to totally resolve the problem of financing our infrastructure needs. The answer lies in the better management of infrastructure and rationalization of water and sewer pricing.

Where do we go from here? For us at CMHC, some of the next steps are clear. The completion and dissemination of the papers presented at the workshop and the preparation of the workshop proceedings are two of the most obvious next steps.

We should all build on the momentum created by this workshop and try to develop partnerships to carry out research and work more closely together. We at CMHC intend to work with our federal colleagues, provincial counterparts, industry, and other interested parties to examine the feasibility of creating a national clearinghouse and electronic network that would facilitate the transfer of technology and the exchange of information among all those involved in the area of infrastructure. There seems to be a great deal of interest in this type of mechanism.

On the subject of information exchange, there appears to be an interest in regularizing these types of meetings — and this will be taken under advisement.

On the same subject, we at CMHC chair and provide secretarial services to the National Housing Research Committee. The Committee includes representatives of all provincial and territorial housing agencies, industry associations, and a number of federal departments and agencies. The objectives of this committee are to coordinate research efforts, encourage the sharing and implementation of research results, and promote the more effective use of scarce research funds. Under the NHRC, a number of working groups have been established. These groups focus on topics such as technological innovation, trade, environment, and indoor air quality. The creation of a working group on municipal infrastructure and housing under the umbrella of the National Housing Research Committee would help to forge new partnerships and promote the exchange

of information and research results in the subject area. CMHC intends to gauge the interest among the participants' respective organizations in the creation of such a sub-group.

I would like to leave you with a comment that one participant made early on in the workshop: we are the previous generation of the next generation, and we are the generation who created the infrastructure that the next generation will have to live with. I hope that this workshop contributed in even a small measure toward engendering a more favourable evaluation from the next generation.

■ Appendix ■

AGENDA

WORKSHOP ON MUNICIPAL INFRASTRUCTURE AND HOUSING

MARCH 22-23, 1995
THE WESTIN HOTEL, OTTAWA

DAY 1

9:00 - 9:15 **Opening Remarks**
Douglas A. Stewart, Canada Mortgage and Housing Corporation

9:15 - 12:00 ■ **Assessing Municipal Infrastructure Conditions** ■

Issues:

- Are municipalities aware of the condition of their own infrastructure?
- What lessons can we learn from current practices related to the assessment of municipal infrastructure conditions?

Moderator: Hani Mokhtar, Office of Infrastructure
Speaker: Guy Félio, National Research Council Canada
Panelists: Serge Pourreaux, Centre d'expertise et de recherche en infrastructures urbaines
Bob Funke, Town of New Glasgow
Tom Field, CH2M Hill Engineering
Sebastian Moffatt, Sheltair Scientific Ltd

9:15 - 10:30 **Presentations**

Speaker: 30 minutes
Panelists: 10 minutes each

10:30 - 10:45 **Health Break**

10:45 - 12:00 **Round Table Discussion**

12:00 - 1:30 **Lunch** (served in "Les Saisons" Room)

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1:30 - 5:00

■ Cost Savings Through Alternative Planning Approaches ■

Issues:

- What is the relationship between alternative planning approaches and infrastructure?
- How effective are alternative planning approaches in reducing infrastructure costs?

Moderator:	Hok-Lin Leung, Queen's University
Speakers:	Ken Ferguson, Hygeia Consulting Services
	Ray Essiambre, Essiambre Phillips Desjardins
Panelists:	Owen Tobert, City of Calgary
	Art Mellish, Consor Developers Inc.
	Ron Desjardins, Brethour Research Associates

1:30 - 3:00 **Presentations**

Speakers: 30 minutes each
Panelists: 10 minutes each

3:00 - 3:15 **Health Break**

3:15 - 5:00 **Round Table Discussion**

5:00 **Adjournment**

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DAY 2

9:00 - 12:15 **■ Financing of Municipal Infrastructure ■**

Issues:

- Public/private partnerships in infrastructure financing: what are the implications for housing?
- What are the conditions for a successful public/private partnership arrangement?

Moderator: Ted Bryk, Canadian Home Builders' Association
Speaker: Kenneth Whitwell, IBI Group
Panelists: Kennedy Self, City of Scarborough
Robert Cumming, River Oaks Group
Enid Slack, Enid Slack Consulting

9:00 - 10:30 **Presentations**

Speaker: 45 minutes
Panelists: 15 minutes each

10:30 - 10:45 **Health Break**

10:45 - 12:15 **Round Table Discussion**

12:15 - 1:45 **Lunch** (served in "Les Saisons" Room)

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1:45 - 4:00 **■ Information Dissemination ■**

Issues:

- Current constraints and impediments to information dissemination.
- Alternative means of disseminating information on municipal infrastructure.

Moderator: Serge Pourreaux, Centre d'expertise et de recherche en infrastructure urbaines
Speaker: Chris Gates, REIC Limited
Panelists: Dan Friesen, Federation of Canadian Municipalities
Michel Gauvin, Intergovernmental Committee on Urban and Regional Research
Roger Mareschal, City of Aylmer and Commission d'urbanisme de la Communauté Urbaine de l'Outaouais

1:45 - 3:00 **Presentations**

Speaker: 30 minutes
Panelists: 15 minutes each

3:00 - 3:45 **Round Table Discussion**

3:45 - 4:00 **Health Break**

4:00 - 4:45 **Closing Session**

4:00 - 4:45 **Wrap-up** by the Workshop Rapporteur
Pierre Letartre, Université Laval

4:30 - 4:45 **Closing Remarks**
Douglas A. Stewart, Canada Mortgage and Housing Corporation

4:45 **Adjournment**

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